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ABSTRACT

Abstracts of research papers presented at the annual conventions of the Association for Educational Communications and Technology during the years 1970-74 are collected with an introductory statement and listing for each year. The name of each presenter is given along with title and mailing address. Papers are collected in the order in which they were presented. Most of the papers are also available in their complete forms through ERIC. (SK).

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AECT Abstracts

Of

Research Papers Presented at the

ASSOCIATION FOR EDUCATIONAL COMMUNICATIONS AND TECHNOLOGY

ANNUAL CONVENTIONS, 1970 through 1974

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STANFORD UNIVERSITY
STANFORD, CALIFORNIA 94305

INSTITUTE FOR COMMUNICATION RESEARCH
ERIC Clearinghouse on Educational Media and Technology

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April 27-May 1, 1970

ERIC at Stanford is pleased to be able to cooperate with the DAVI Research Committee and John A. Moldstad, its chairman, in making these abstracts available for distribution at the convention.

While the supply of the printed abstracts is limited, the clearinghouse has the whole collection available on a microfiche, and would be pleased to respond to a request for a complimentary copy.

(# 9431)

All but two of the research papers presented at the convention are represented in these abstracts. The two missing ones were not received by publication deadline.

The abstracts are listed on the back of this letter, in the order in which they are presented in the collection.

William J. Paisley
Don H. Coombs

Clearinghouse Co-Directors

Research Abstracts for 1970 DAVI National Convention
(Listed in the order in which they appear in this collection)

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4. G. F. McVey, "ETV: Where Do We Sit?"
2. Paul E. Fields, "Teaching Tests Revolutionize Effectiveness of Classroom Films"
3. Mina B. Ghattas, "Effect of Filmographic 'Advanced Samplers' on Learning from a Motion Picture"
5. Paul D. Miller, "Relationship of Teacher Perceptions of a School's Audiovisual Climate to the Organizational Structure of Its Media Program"
9. Ronald W. Spangenberg, "Structural Coherence in Verbal and Pictorial Displays"
6. Charles C. Aquino, "Teacher Attitudes Toward Audio-Visual Instruction"
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8. Edward E. Lewis, "Teacher Perceptions in Relation to Educational Media"
10. W. Daehling, "Learning Effects of Seven Visual-Verbal Presentation Modes on Making Identifications and Comparisons"
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12. Francis M. Dwyer, Jr., "The Effect of Stimulus Variaoility on Immediate and Delayed Retention"
13. Robert Bullough, Sr., "Variation of Information Presentation as a Method of Accommodating Individual Differences"
14. Malcolm Fleming, "Analysis of Recent Perceptual Research Literature and the Derivation of Principles for the Design of Instructional Materials"
15. Robert G. George, "Mode of Presentation and Comprehension of Compressed Speech"
16. Margaret Jones and Virginia Zachert, "Programmed Materials in a Coordinated Medical School Pathology Curriculum"
17. Ronald J. Sparks, "Audio-Visual Programs for Continuing Education"
18. Jack C. Everly, "Effect of Mediated English Counseling via Auto-Tutorial Methods on the Writing of Research Reports in a Basic Field Crops Instructional System"
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21. G. Gardner Snow, "Analysis of Doctoral Level Preparation Programs in the Field of Instructional Technology at Selected Institutions"
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25. David Alan Gilman, "Retention of Concepts Learned As a Result of Several Feedback Modes in Computer-Assisted Instruction"
26. Keith A. Hall, "Inservice Mathematics Education for Elementary School Teachers Via Computer-Assisted Instruction"
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29. Eleanor P. Godfrey, "Innovation, Research on Educational Technology, and the School Superintendent"
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35. "Walter J. Utz, Jr., "The Use of Computer Generated Tests to Select a Speaker for a Random Access Digital Audio System"
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39. Marie McMahan, "A Study of the Feasibility of a System of Pre-Service Teacher Education in Media"

Abstract No. 1 Gross

AN ASSESSMENT OF THE EFFECTIVENESS OF TEACHER STUDY GUIDES USED IN CONJUNCTION WITH EDUCATIONAL TELEVISION LESSONS

Dr. Lynne S. Gross
Television Professor and Coordinator
Long Beach City College
4901 East Carson
Long Beach, California 90808

As Prepared
for the Research Paper Presentations
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The object of this study was to determine the effectiveness of three different types of study guide materials given to teachers whose classes watched televised music lessons. The three treatments were as follows:

1. One group of teachers used the regular study guide prepared by the Los Angeles County television teachers which included a description of the program content, suggested activities to do before and after the program, and other supplementary material.

2. A second group of teachers used guides which gave only the description of the program content and not the suggested activities or other supplementary material.

3. A third group used just a list giving the program titles and dates and had no actual study guide.

The hypothesis was that in terms of student achievement, student opinion, teacher preference, class activities, and teacher opinion, treatment 1 (guide) would be significantly superior to treatment 2 (description) and 3 (titles) and treatment 2 (description) would be significantly superior to treatment 3 (titles).

For the study, forty-two 4th, 5th, and 6th grade classes of the Long Beach School District were used. The classes were randomly assigned to treatments with fourteen classes in each. The teachers were given the appropriate guide materials and asked not to use any other materials during the course of the experiment.

After each of the first three programs, the teachers were mailed objective quizzes covering the content of the programs which they gave to the students. These quizzes were used to determine student achievement by means of t-tests.

At the end of the three programs, the teachers had their students complete opinion questionnaires about the series, and this datum was used to test for student opinion again by means of t-tests.

The teachers also filled out a questionnaire at the end of the experiment from which three measures were taken. As an initial task, the teachers were asked to rank the guide materials in the order they would have preferred them had they had their choice, and this data was used to test teacher preference by means of a Friedman test.

For the second measure, the teachers were asked to check those classroom activities which they conducted in connection with the program, and these checks were added and used to test for the differences by means of t-tests.

For the third measure, the teachers were asked to give quantified reactions to the guide material they had used during the experiment, and the information collected here was used to test teacher opinion by means of a chi-square test.

Generally speaking, the results were overwhelmingly significant with half the measurements being significant above the .01 level. The greatest significance was found in tests comparing the guide and titles, and a slightly lower degree of significance was found in tests comparing the guide and description. Therefore, the first part of the hypothesis is accepted, namely that treatment 1 (guide) is superior to treatment 2 (description) and 3 (titles). With one exception, the tests comparing description and titles were not significant, so, therefore, the second part of the hypothesis is rejected, namely that treatment 2 (description) is superior to treatment 3 (titles).

Although this experiment encompassed only one series of programs and one study guide, it indicated that there is very definite value in study guides used with television lessons.

Abstract No. **2** Fields

TEACHING TESTS REVOLUTIONIZE EFFECTIVENESS OF CLASSROOM FILMS

Paul E. Fields
Professor of Psychology
University of Washington

As Prepared
for the Research Paper Presentations
at the 1970 DAVI Convention
in Detroit (April 27-May 1)

and Reproduced for Distribution
at the Convention
by ERIC at Stanford,
Stanford, Calif.

Somehow, the bright future that was envisioned for A-V materials some 25 years ago has never materialized. The reason for that failure may be laid directly to outmoded research studies which still tell me that the approved method of using a film is to "introduce it, screen it, discuss it, and then show it again to answer all the questions." We all know that is impossible in this age. But let me tell you what I have done with more than 5,000 students during the last five years with the help of a new instructional device, the Serial Multiple Discrimination Teaching Examinations, or simply, Teaching Tests.

I now teach one introductory psychology class of 350-500 students each quarter; I cover a larger, more complete text in 50 class sessions of one quarter than when the course extended over a full academic year; the level of achievement is now 50 to 100 per cent higher than it has ever been previously; and in addition, *I now screen and examine over 50 reels of films, more than 100 slides of a 300 slide series, and more than 100 overhead transparencies.* One half of all my exam questions are taken directly from the A-V materials, with no loss of mastery of textbook content, and *the modal score on most exams is a perfect score.* Because of severe budgetary restrictions, I am assigned only one graduate Teaching Assistant, must use biweekly instead of weekly exams, and I spend 15 hours in student conferences each week.

At the time Pressey started working with his first selfscoring tests, I was an interested undergraduate. The idea for the present Teaching Tests was not developed until 40 years later when I adapted the principle of the latin square method for a paper and pencil test.

A sample block of five TT questions and their special answer sheets are presented on page 1 of the handout (to be distributed at the meeting). Each block of five TT questions has five numbered true-false stems with four lists of five true matching associations above them. On the special TT answer sheet, you are to slash the + or – symbol underneath the question number to indicate whether you think the stem is true or false; then slash the one letter in each of the four columns of letters which corresponds to the closest true matching association in each of the four lists of five lettered matching alternatives. (The correct answers for questions 1-5 are slashed to illustrate the Verified Latin Square format). If you choose the correct matching alternatives, the symbol in column five opposite the row with no slashes will verify your first tentative T-F answer to that question. Since each letter is only used once in a block of five questions, if the answers to any four questions are all correct, the answers to the fifth question must be the one letter and symbol in each column that has not been used previously.

Students study TT questions of the VLS variety as a homework assignment before they see the film, and look for answers to the questions they had missed when it is screened in class. In order to eliminate rote memorizing, and emphasize the association of ideas, class examinations are given over the same or new material with the ILS format (new orders for both questions and matching associations with the verification column eliminated) or the IRB format (order of the matching associations has been randomized), both of which reduce feedback.

Teaching Tests over films have been administered under various combinations of before and after screening, and before and after having studied the questions in a verified latin square format. The amount and immediacy of feedback on the regular course exams was controlled and successively reduced by changing the order of the question parts, by using different VLS, ILS, and IRB blocks. In spite of the low chance success factor (the probability of getting a single question correct solely by guessing can be as low as 1/6, 250, and all five parts must be correct to score a single point) the modal score on most exams has been a perfect score, and the quarter's cumulative distribution is markedly skewed. Item analyses are routinely completed on all questions prior to the next class meeting.

Results. Date from Table 1 on page 2 of the handout reveals that new TT questions over lectures are harder than questions over the text or films; that new TT questions are more difficult than old familiar questions; and that questions presented in the randomized format are more difficult than in either VLS or ILS formats. When the identical film questions were presented again after studying them and after seeing the films (Table 1, rows 11 and 12) there was an absolute increase of 52 percentage points in achievement, with only an 8 percentage point drop in the discrimination index, and none in the internal consistency coefficient. This finding is contrary to what has been found with other types of objective exam questions, and it eliminates the necessity for rigorous examination security pro-

cedures. All students should have ready pre-test access to all of the questions. The good students master more questions at a faster rate than the slow students, resulting in high discrimination indices and internal consistency coefficients.

Previous studies have shown that balanced experimental designs, where one student was given two types of questions or two formats on the same exam, always resulted in inflated t's because the students would spend most of their time on the question format that paid off with the highest scores. More conservative data were obtained when different groups of individuals were assigned to a single examination format. When data from many different TT questions of the same kind were summated across several successive quarters, an interesting new finding appeared. (See Table 2, page 3 of the handout.) Scores for the top criterion group on both new and familiar textbook *and film* questions decrease with decreased feedback. Although scores for the bottom criterion group also decreased on new questions, *they actually increased as less feedback was provided on the old, familiar film questions.* One possible explanation might be that the college students with poor verbal proficiency were able to manipulate the pictures more meaningfully than they could the verbal symbols. This finding is especially significant for the teaching of "disadvantaged" students.

The data from Table 3 on the film *Behavior Modification* emphasizes the importance of feedback from the latin square format in answering complex questions. When the identical questions were presented again five weeks later, but without the cues from the latin square arrangement or the verifying symbols, the top criterion group displayed the largest decline we had ever witnessed, but the bottom group was not affected. A subsequent analysis revealed that it was impossible to discriminate logically between the matching associations for certain questions once feedback was removed. The only way they could be answered correctly on the retest was to remember which associations had been reinforced five weeks earlier with the latin squares. The discrimination index for these difficult questions was higher than for the others.

The new and unambiguous questions covering much simpler concepts taken from the *Titicut Follies* film (Table 4) were answered with excellent accuracy on their very first presentation. With this relatively familiar and popular subject matter, changing the examination format to reduce feedback was more detrimental to the bottom criterion group of students than to the top group.

Earlier studies have shown that students taught with the TT's earn a higher proportion of correct answers, and have a wider range of scores than on other objective exams; they also scored above the mean on new exams over comparable material which were prepared by professors at other universities; and item analyses have consistently shown larger discrimination indices and internal consistency coefficients for TT than for TF or MC questions. Technically the TT's are not programed devices (although they can be), but the results from one early study suggested that they were as effective as certain programed texts. The availability of a programed film enabled us to extend our study to compare the relative effectiveness of the Fields Teaching Tests and the Markle and Tiemann Programed Notes in learning the content of the programed film *Programing is a Process.* (See page 5 of handout.)

A conventional experimental design was selected, and the Programed Notes and the training TT's distributed to a selected half of the class. On the day after the film was screened a 30 item TT and a 120 item TF exam were administered. Unknown to the students, the TF exam contained 30 questions over each of four areas to help pinpoint experimental effects. The appropriate examinations were administered to four groups of 80 Psychology students and one group of 40 Engineering students.

Table 6 shows that among the Psychology groups, the total test scores of those students who had officially studied the TT's were superior at the .001 level of confidence to those who used the Program Notes, regardless of whether they took the TT or the TF test. There was no significant difference between the total scores of the Psychology students and the Engineers who had studied only the Program Notes. When the part scores on the TF test were analyzed, the scores of the Psychology students who had studied the TT were significantly superior to those who had studied the Program Notes for all but the items which were taken directly from the film and not mentioned in the TT. Quite unexpectedly, the scores of the students who had studied the true matching associations in the TT training tests were significantly better than those who had studied the Program Notes even after 15 of these same questions were changed from true to false. Evidently the students were not rote memorizing the TT's, but were responding to the larger ideas involved in the associations.

Fifty-six per cent of the group who had studied the training TT's made perfect scores on the TT exam as opposed to seven per cent for students who had studied the Program Notes. In spite of the very high achievement level of those who had studied the training TT's, item analyses showed significantly better average discrimination indices (.29 to .11) and internal consistency coefficients (.57 as opposed to .22) for the TT items than for the TF items.

Conclusions. Teaching Tests do teach! They are especially valuable for use with films because they make it possible for films to "teach on their own" after they are put on a par with the text, without the necessity of taking additional large amounts of precious classroom time. Since Teaching Tests discriminate exceptionally well between good and poor students at very high average levels of achievement, the utilization of teaching films will increase.

Abstract No. 3 Ghattas

EFFECT OF FILMOGRAPHIC "ADVANCE SAMPLERS" ON LEARNING FROM A MOTION PICTURE

Mina Butros Ghattas
Associate Professor of Audiovisual Education
Wisconsin State University
La Crosse, Wisconsin

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for the Research Paper Presentations
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in Detroit (April 27-May 1)
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Stanford, Calif.

Purpose

The purpose of this study was to investigate the effect that filmographic "advance samplers" rapidly flashed at the beginning of a silent black and white film might have on the amount of learning from that film.

Procedure

A black and white silent 16mm film depicting an incident was produced and utilized for the stimulus situation. The "advance samplers" consisted of still shots of scenes copied from the main body of the test film. A total of thirty-five such scenes arranged chronologically according to how they later appeared in the motion picture were shot on strips of 16mm film and spliced at the beginning of the test film. Thus all sequences of "advance samplers" utilized the same number of scenes arranged in the same order and were shown, either once or twice in immediate succession, as short filmographs at the beginning of the test motion picture which was also the same in all treatments. The "advance samplers" ranged from 70-210 frames (2.9-8.8 seconds) in length depending on the treatment. (See the table.) The test film was 146 ft. (3 minutes 40 seconds) long.

DESCRIPTION OF TREATMENT CONTENTS IN INTRODUCTORY STRIPS

Sequence Orders	Content	TREATMENTS 1 Control	2 2F	3 3F	4 4F	5 6F	6 2X2F	7 2X3F
1	Black	72F	72F	72F	72F	72F	72F	72F
2	START	48F	48F	48F	48F	48F	48F	48F
3	Black	292F	150F	115F	80F	10F	80F	10F
4	"A.S."	None	70F	105F	140F	210F	140F	210F
5	Black		72F	72F	72F	72F	72F	72F
Total Length		412F	412F	412F	412F	412F	412F	412F

"A.S." = "Advance Samplers" consisting of 35 scenes.
F = Frames.

A total of seven treatments were conducted. These included one control group utilizing the film without any "advance samplers," four groups (treatments 2, 3, 4 and 5) each viewing a different length of "advance samplers" shown only once at the beginning of the film, and two groups each viewing a different length of "advance samplers" shown twice in rapid succession at the introduction of the film (treatments 6 and 7). Total "viewing" time for all treatment groups was kept the same by inserting black film leader in the introductory strip between START and the first frame of the "advance samplers" sequence.

Groups of equal numbers of ninth graders from three schools in Wisconsin were used in every treatment. Selection of subjects was unbiased, and treatment-per-group assignment in each school was random. A total of 315 subjects was used.

All participants took a multiple-choice test consisting of "witness stand" type questions based on the film. This was administered immediately following the presentation of the motion picture. Instructions prior to the

film presentation were minimal, and the groups viewing the "advance samplers" treatments were simply alerted to the presence of scenes at the beginning of the film. All groups were told that they were to answer test questions based on what they saw in the film.

Results

The reliability of the test used was determined by testing the internal consistency of responses utilizing the FORTAP (Fortran Test Analysis Package) program. The program utilizes the Hoyt Analysis of Variance Method. The reliability coefficient obtained was .54. This was based on the performance of all 315 subjects together, not as per treatment group. A one-way analysis of variance was done to test the effects of the treatments. The F ratio obtained was significant at the .05 level. A post-hoc analysis of pairwise comparisons among means utilizing Duncan's New Multiple Range Test showed the difference to be between treatments *4* and *6*, and between *6* and *7* favoring treatment *6* in both cases. Treatment *4* utilizes a single sequence of four frames per scene of "advance samplers"; treatment *6* utilizes a double sequence in immediate succession of two frames per scene of "advance samplers"; and treatment *7* utilizes a double sequence in immediate succession of two frames per scene of "advance samplers." None of the other comparisons were significant. Also, Pearson product-moment correlations were computed between intelligence test scores and performance scores in the study by school and treatment. Only three out of twenty-one correlations were significantly different from zero at $\alpha = .05$, but the overall pattern was not consistent enough to permit making any inferences about the kind of relationship between intelligence and performance in this study although a strong school effect was observed.

Interesting as they may seem to be, the findings of this study should be interpreted with considerable caution. This is suggested by both the statistical results and the nature of the findings reported above.

Recommendations

On the basis of the findings of this study and the experience of the researcher in the process, the following is recommended:

1. For possible replication of this study, a revised test of higher reliability will be necessary.
2. Observing the insignificant difference between the control group and the other treatments utilizing "advance samplers" so short in duration, it may be advantageous to attempt using longer strips that are perhaps one second long or even try a proportional formula in selecting the scenes used in the "advance samplers" sequences depending on the length or importance of what is to be emphasized.
3. As it seems that film viewers have a tendency to look for the *action and process* in a motion picture more than the apparent details emphasized in this experiment, future experimental designs should take that factor more into consideration, and films other than the "witness-stand" type should be utilized.
4. In films that emphasize concepts, it would probably be advisable to have fewer scenes presented for a longer time for emphasis, and perhaps try two sequences, one short at the very start followed by a longer one of the same nature in the manner utilized in this experiment.
5. Considering the fact that tachistoscopic studies normally have a "rest" interval between scenes, it may be worthwhile trying more than one sequence of "advance samplers" separated by black leader film of appropriate length.
6. The same type of material used in this study as "advance samplers" may in some future study prove to be effective as "summarizers" if placed at the end instead of the beginning of the film. A combination of both "advance samplers" at the beginning and "summarizers" at the end may even be best of all.

Abstract No. 4 McVey

EDUCATIONAL TELEVISION: WHERE DO WE SIT?

G. F. McVey
Coordinator, Multimedia Instructional Laboratory
University of Wisconsin

As Prepared
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Problem: To develop a set of television utilization guidelines (viewing distances, angles) that could be supported by an empirical and experimental research rationale.

Procedure: Selected academic, scientific, and professional publications were reviewed for relevant information. These materials included documents from the fields of: environmental design ophthalmology, display systems engineering, and human factors engineering. Relevant information was synthesized and applied to the problem.

Conclusions: A desirable television-viewer interface is only possible when the viewer is seated within the AUDIENCE VOLUME. The audience volume has been shown to have an ellipsoidal shape with certain areas designated for best viewing, accuracy and visual comfort. The external boundaries of the volume are those locations from which elements displayed via television may be seen with minimum acceptable identification accuracy. Seating locations outside of the volume are not recommended for TV viewing.

Optimum viewing locations have been identified as being located in a space that starts from a distance of 2W or 4W (depending upon TV resolution) and extends to 6W. This space includes horizontal angles of 15 degrees either side of the perpendicular axis and vertical angles of +15 degrees and −24 degrees from the optimum line of sight, a line drawn −5 degrees from the perpendicular axis.

There are other areas within the audience volume which will allow for acceptable viewing but with some loss in legibility and viewer comfort. Proper orientation of seating to the TV set can be a critical factor in the postural development of the young child. The tilting of the TV screen toward the center of the viewing area will minimize vertical image distortion. It should be remembered that the establishment of any set of viewer-display recommendations is the product of a number of 'trade-offs', or compromises within established tolerable viewing limitations and that it will be up to the individual user to set his own priorities.

Abstract No. 5 Miller

THE RELATIONSHIP OF TEACHER PERCEPTIONS OF A SCHOOL'S AUDIOVISUAL CLIMATE TO THE ORGANIZATIONAL STRUCTURE OF ITS MEDIA PROGRAM

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Stanford, Calif.

Paul D. Miller
Northwest Nazarene College
Nampa, Idaho

Purpose

The primary purpose of this study was to ascertain, through teacher perceptions of the audiovisual climate within a school, some of the factors which might have influence upon the utilization of audiovisual media in the teaching-learning process.

The major questions of this investigation were:

1. What are some of the relationships between a school's audiovisual climate and the type of media program in evidence?

2. What are some of the relationships between a school's audiovisual climate and the professional training and status of the media personnel?

Procedure

Audiovisual climate was described as the consensus of teacher perceptions of environmental conditions existing within an individual school which might have influence on the utilization of audiovisual media.

An Audiovisual Climate Questionnaire (AVCQ) was designed by the author to obtain individual teacher perceptions of total group conditions. This instrument was administered to a random selection of twelve teachers in each of fifty secondary schools in five North Central States.

Schools were selected for the study which were not the recipients of "outside" audiovisual services from school districts or regional centers.

Findings

Schools having organized audiovisual programs, with released time audiovisual coordinators, had audiovisual climates that were significantly superior ($p < 0.001$) to those in schools not having an organized audiovisual program with released time audiovisual coordinators.

Schools having unified media programs had audiovisual climates that did not differ significantly ($p > 0.05$) from schools having separate audiovisual and library programs.

Schools having a full-time audiovisual coordinator had audiovisual climates that were significantly ($p < 0.0001$) superior to those having part-time audiovisual coordinators.

Schools with part-time audiovisual coordinators had audiovisual climates that approached significance ($p > 0.05$) in superiority over schools not having anyone with released time for audiovisual coordination.

The background preparation area of the audiovisual coordinator was important for the determination of a school's audiovisual climate. Schools having audiovisual coordinators with basic preparation in non-print or audiovisual areas had audiovisual climates that were significantly ($p < 0.01$) superior to schools having audiovisual coordinators with basic preparation in the print or library science areas. This was true, even though most of the audiovisual coordinators with basic preparation in library science also had one or more courses in non-print media.

Recommendations

1. Schools concerned with the effective development of a total media program should not be content with less than a full-time audiovisual coordinator. This investigation indicated that when a part-time coordinator is permitted to devote full-time to audiovisual responsibilities, he should be able to significantly improve the effectiveness of a media program.

2. Schools should seek out audiovisual coordinators with basic background preparation in the audiovisual areas, and not give this responsibility to librarians as an addendum to their print obligations.

3. Educators should not assume that a unified media program and its related services will provide a superior audiovisual program for their school.

4. Universities and colleges concerned with preparing media specialists for responsibilities in audiovisual areas, should re-evaluate their training programs to ensure that sufficient course work is required in the non-print media areas.

Abstract No. 6 Aquino

TEACHER ATTITUDES TOWARD AUDIOVISUAL INSTRUCTION AS THEY ARE INFLUENCED BY SELECTED FACTORS WITHIN TEACHING ENVIRONMENTS

Charles C. Aquino
Associate Professor
Instructional Resources Division
State University College at Buffalo, New York

As Prepared
for the Research Paper Presentations
at the 1970 DAVI Convention
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It was the intent of this research to investigate teacher attitudes toward audiovisual instruction as they were related to eight factors within teaching environments which a population experienced during their first semester of teaching following study in audiovisual education. Relationships which were discovered for the factors which involved availability and accessibility of educational media within teaching environments will be the basis for this paper, for those relationships revealed the population's concern for subtle differences between the influence of "availability" and "accessibility" upon their attitudes toward audiovisual instruction.

Educators who studied a graduate course entitled "Audiovisual Education" at the University of Manitoba during Summer, 1968 and who returned to teaching duties during the academic semester immediately following those studies comprised the population for the research. A preliminary investigation had determined that the population improved in their attitude toward audiovisual instruction during the period encompassed by studies in that area. In order to determine further changes in direction and intensity of attitudes, a subsequent measure of that construct was made at the conclusion of the population's first semester of teaching following the audiovisual education course. The *New Media Attitude Scale* (NMAS) was utilized as the principal instrument for gathering information concerning attitudes toward audiovisual instruction (Ramsey, 1961). Data derived from two administrations of the NMAS allowed the researcher to determine changes in attitudes by individuals within the population and thus, to divide the population into sub-groups on the basis of positive or negative changes in direction and intensity of their attitudes toward audiovisual instruction.

Information involving factors within the teaching environments was self-reported by the population through responses to a five-point rating scale which signified degrees of favorableness or unfavorableness for each factor. This data allowed for the development of a series of two by two matrices for determining factor-attitude relationships. A phi coefficient statistic was used to learn the extent of factor-attitude relationships, and chi square derived from phi indicated the significance of those relationships.

In order that the population not confuse "availability" and "accessibility" as being synonymous, those terms were not included *per se* on the rating scale which was employed for the collection of teaching environment data. Rather, scales soliciting information on those factors were stated in terms of "school ownership" for availability factors, and of "attainability during times of need" for accessibility factors. Thus, it is unlikely that incorrect definitions on the part of the population were responsible for the differences which were perceived between availability and accessibility of educational media.

Analysis of the data indicated that the population was not concerned as to the amounts of audiovisual equipment which their schools owned, so long as that equipment was accessible to them when it was needed for instructional use. On the other hand, the population attached great significance to the amount of audiovisual materials which their schools owned as well as to the accessibility of such materials. Relative to these conclusions, it is interesting to note that the matrices utilized in determining factor-attitude relationships revealed that no one in the negative attitude change group noted that audiovisual materials were *available* in amounts sufficient for their instructional needs, and no one in the positive change group noted that audiovisual equipment and materials were not *accessible* to them when needed. This situation required application of Yates' continuity factor to cell sizes for arriving at significance levels. Without Yates' factor, significance would have approached the .01 level for each of those analyses.

The obvious recommendation to be drawn from such findings is that school administrators and educational communications personnel attend more carefully to the acquisition and accessioning of both audiovisual equipment and materials. It would appear that the population was interested in audiovisual equipment only to the extent that it fitted their intended utilization plans, but that they desired audiovisual materials to be available in quantities which permit browsing, previewing and planning as well as being highly accessible for classroom utilization. This conclusion offers support for the purchasing of multiple copies of certain audiovisual materials for use within a

single school building.

Interpretations of subtler aspects of the data reveal implications for further study into matters of availability and accessibility of educational media within teaching environments. Thus, the findings pose the following questions:

***Was the population satisfied in responding to availability and accessibility factors as they related to the whole of educational media within their teaching environments? Under the conditions imposed by this study, the population was forced to respond in just that fashion. Perhaps an instrument which offers many scales for various types of audiovisual equipment and materials would reveal specific relationships between certain items and teacher attitudes toward audiovisual instruction. Here, indeed, would be firm ground for suggesting educational media standards which might truly influence teacher applications of educational media to the teaching-learning process.

***Did the attitude measurement instrument utilized for the study provide correct indications of attitudes toward the entire field of educational media? While developmental and testing data for the NMAS suggest that the NMAS is a suitable indicator of attitudes toward educational media, it is justifiable to speculate that respondents may have widely varying attitudes toward different aspects of educational media. Therefore, an attitude measurement instrument which provides indications of attitudes toward various aspects of educational media might be of greater validity for the type of research reported here. Dr. Paul Dawson, Teaching Research Division, Oregon State System of Higher Education is currently testing an instrument—the *Media Attitude Profile* (MAP)—which shows promise for that type of application.

The writer has recently begun an investigation which will seek answers to the preceding questions and which will utilize the MAP and a revised factor rating scale for the collection of data.

A major implication emanating from this study is the need for further evidence which relates teacher attitudes, as indicated by an attitude measurement scale, with behaviors exhibited by teachers when functioning within teaching environments which afford various degrees of availability and accessibility for educational media. Should an investigation of more specific and definitive aspects of teacher attitudes toward audiovisual instruction support the general findings which have been reported here, those factor-attitude relationships which are discovered may provide the basis for simulating conditions which reflect upon availability and accessibility of educational media within actual teaching environments. Thus, researchers would be enabled to manipulate availability and accessibility of audiovisual equipment and materials and observe teacher behaviors toward educational media under circumstances which approximate a wide variety of possible teaching-learning environments.

Ramsey, C. *A Research Project for the Development of A Measure to Assess Attitudes Regarding the Uses of Newer Educational Media.* Nashville: George Peabody College for Teachers, 1961.

Abstract No. 7 Grant-White

A STUDY OF THE PERSONALITY CHARACTERISTICS OF THE ACCEPTOR AND THE REJECTOR OF THE NEWER EDUCATIONAL MEDIA AMONG SECONDARY TEACHERS OF WISCONSIN

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Dr. Alfred D. Grant
Assistant Professor, Media Consultant
School of Nursing

and Dr. Frederick A. White
Associate Director, Educational Communications
Professor, School of Education
Extension Division
University of Wisconsin
Madison, Wisconsin 53706

This study explored certain personality characteristics of 253 high school teachers who were classified as acceptors and rejectors of the newer educational media. The study was limited to high school teachers located at seven consecutive school building sites visited by the *Wisconsin Audiovisual Education Demonstration* (WAVED), 1968-1969.

Null Hypothesis

There are no significant differences for 14 personality traits among male and female high school teachers classified as acceptors or rejectors of the newer educational media as measured by the Edwards Personal Preference Schedule.

Methods

1. The Kelley Audiovisual Attitude Scale was selected to determine the attitude posture of the respondents.

2. The Edwards Personal Preference Schedule was selected to measure the personality traits of the respondents. The *Heterosexuality* dimension was deleted because of the possible rejection of the entire Edwards scale.

3. A WAVED Utilization Scale was designed to determine the acceptor and rejector categories based on the teacher's utilization of the WAVED unit at each of the seven locations.

Conclusions

1. There were 78 rejectors, 63 average acceptors, and 112 acceptors of the newer educational media based upon the WAVED Utilization Scale.

2. Respondents at six of the location sites showed a positive mean change of attitude toward audiovisual media. This change of attitude might be attributed to the influence of the WAVED unit during its stay. The faculty of the seventh location showed a negative mean change of attitude toward audiovisual media.

3. There was a positive mean change of attitude toward audiovisual media for the 21-60 age group. There was a negative mean attitude change for the 61-70 age group. The Wisconsin Audiovisual Demonstration seemed to be influential in the improvement of attitude towards audiovisual media for all age groups except the 61-70.

4. There was an over-all positive mean change of attitude for both males and females who responded to this research.

5. There was a higher number of acceptors than rejectors at those school sites located in the rural areas. There was a substantial number of both acceptors and rejectors in the larger metropolitan areas.

6. There were more acceptors than rejectors in the subject areas of English, foreign language, science, and history-social studies. There were more rejectors than acceptors in the subject area of math.

7. There was a negative mean attitude change towards audiovisual media for respondents with 36 or more years of teaching experience.

8. Male respondents to the Kelley Audiovisual Attitude Scale had a higher post-attitude and change of attitude mean than did female respondents.

9. There was significance for certain personality traits among male and female acceptors and rejectors of the newer educational media. The null hypothesis was rejected for the following *male acceptor* traits: *Intraception,* Dominance,** Change,** and *Aggression.*** The null hypothesis was rejected for the following *female acceptor*

traits: *Order,*** *Exhibition,*** *Autonomy,** and *Succorance.*** The null hypothesis was rejected for the following *male rejector* traits: *Deference,*** *Affiliation,*** *Succorance,*** and *Nurturance.*** The null hypothesis was rejected for the following *female rejector* traits: *Affiliation,*** *Intraception,*** *Dominance,*** and *Nurturance.***

The t-test for determining the difference between the means for two groups (acceptors minus rejectors) was calculated for each personality characteristic. A two-tailed test was applied at the .05 and .01 level of significance.

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* .05
** .01

Abstract No. 8 Lewis

A STUDY TO DETERMINE TEACHER PERCEPTIONS IN RELATION TO EDUCATIONAL MEDIA

Edward Eugene Lewis
Associate Professor (AV) of Education and Psychology
Southeast Missouri State College
P.O. Box 425
Cape Girardeau, Missouri 63701

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Problem of the Study

The problem of this study was to determine classroom teachers' perceptions in relation to educational media.

The problem was to determine the degree, if any, to which the teachers' cognitive domain interacted with his affective domain when educational media were involved in the teaching-learning situation. The problem involved structuring and administering a questionnaire-reactionnaire to a group of classroom teachers in a large school system which yielded data that were classified into independent or cognitive variables; and dependent or affective variables, whereby significant relationships between the sets of variables could be tested in order to acquire knowledge of teachers' perceptions of educational media in a public school classroom situation.

The study was designed to answer the following questions:

1. What does a teacher perceive as necessary training needed by him in the future in relation to educational media?
2. What concepts does a teacher possess in terms of values placed upon educational media by school system administrators?
3. What concepts does a teacher possess in terms of availability for use of educational media in the classroom?
4. What educational concepts does a teacher possess in terms of curriculum value, students' perceptions, and other teachers' use of educational media?
5. What attitudes does a teacher display in terms of money invested in and use of educational media in the classroom?
6. Are there significant relationships between the identified independent variables of age, sex, teaching experience, grade level, formal training and identified dependent variables of future training plans, concepts, attitudes in order that the dimensions of teachers' perceptions relative to educational media might be described?

The null hypotheses tested in this study were:

1. There is no significant difference between the teachers' age and future training plans in relation to educational media.
2. There is no significant difference between the teachers' age and concepts in relation to educational media.
3. There is no significant difference between the teachers' age and attitudes in relation to educational media.
4. There is no significant difference between the teachers' sex and future training plans in relation to educational media.
5. There is no significant difference between the teachers' sex and concepts in relation to educational media.
6. There is no significant difference between the teachers' sex and attitudes in relation to educational media.
7. There is no significant difference between the teachers' years of experience and training plans in relation to educational media.
8. There is no significant difference between the teachers' years of experience and concepts in relation to educational media.
9. There is no significant difference between the teachers' years of experience and attitudes in relation to educational media.
10. There is no significant difference between the teachers' grade level and future training plans in

relation to educational media.

11. There is no significant difference between the teachers' grade level and attitudes in relation to educational media.

12. There is no significant difference between the teachers' grade level and concepts in relation to educational media.

13. There is no significant difference between the teachers' formal training and future training plans in relation to educational media.

14. There is no significant difference between the teachers' formal training and concepts in relation to educational media.

15. There is no significant difference between the teachers' formal training and attitudes in relation to educational media.

The procedures involved the administration of questionnaire-reactionnaire during the school year 1968-1969 to an entire school system in a large city which yielded a 53% return of 733 usable questionnaire-reactionnaires. The instrument was designed to obtain information regarding past educational media experience, formal training, current awareness of media and media personnel, and use of educational media. Results were analyzed by Chi-square.

Conclusions

The findings of this study seem to justify the following conclusions concerning teachers' perceptions relative to educational media:

1. Teachers perceive that the school board provides enough budget for educational media.
2. Teachers perceive that their curriculum coordinator encourages them to use educational media.
3. Teachers perceive that their principal encourages them to use educational media.
4. Teachers perceive that their department head encourages them to use educational media.
5. Teachers perceive that their building representative encourages them to use educational media.
6. Teachers perceive that educational media are easy to obtain for their classroom.
7. Teachers perceive that they would use even more educational media if it were easier to obtain for their classroom.
8. Teachers perceive that educational media fits into the curriculum which they teach.
9. Teachers perceive that educational media are liked by their students; and that students learn easier and faster when educational media are used.
10. Teachers perceive that their peers should use more educational media.
11. Teachers are aware of a school system audiovisual coordinator and building representative.
12. Teachers perceive that future training in the area of educational media is not necessary.
13. More female teachers perceive that educational media are useful to them than do male teachers.
14. Elementary teachers, grades 1-6, have higher levels of awareness and use of educational media than do junior and senior high school teachers.
15. Age is not a clearly relevant variable in the study of teachers' perceptions relative to educational media.
16. Years of teaching experience is not a clearly relevant variable in the study of teachers' perceptions relative to educational media.
17. Formal training, including pre-service, in-service, and outside time spent on educational media, is not a clearly relevant variable in the study of teachers' perceptions relative to educational media.

Recommendations

The following recommendations are made relevant to the study of teachers' perceptions of educational media:

1. There is a need to inform teachers of the array of educational media available to them in a large school system.
2. There is a need to acquaint teachers on the junior and senior high school levels with the uses of the array of educational media available to them.
3. There is a need to inform male teachers on all grade levels of the availability and uses of media.
4. There is a need for further study of teachers' perceptions of educational media in the classroom with encouragement of teachers to pursue formal educational media training.
5. There is a need for professional educators to become more aware of teachers' current perceptions of educational media in order that more utilization may be made of available educational media.

Abstract No. 9 Spangenberg

STRUCTURAL COHERENCE IN VERBAL AND PICTORIAL DISPLAYS

Ronald W. Spangenberg
Human Resources Research Organization
Division No. 2
Fort Knox, Kentucky

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The effects of different levels of structural coherence (SC) and verbal or pictorial informational displays on initial learning and a transfer task are examined. SC is a display characteristic describing the degree to which elements of a display appear as integrated. Three levels of SC are distinguished as minimal SC (no apparent integration of items cued), subgrouped SC (subgroups of approximately five items are cued), and overall SC (the display forms a single unit).

Comparisons involving both pictorial and verbal symbols normally suffer from the lack of a basis for common measurement. Performance of an identical second-stage task in a transfer design may provide some basis of comparison when the initial learning is performed to criterion (a single faultless production). Most previous studies provided a minimal level of SC in an attempt to reduce the variability deriving from the differential perception of relations between items by different subjects. Different relations of identical items as defined by three different levels of SC are compared in equivalent verbal and pictorial displays.

Six displays were created having identical pictorial items or identical verbal items. The items in each display were related in such a way as to form three levels of SC in the verbal and pictorial conditions. A nonsense syllable was associated with each item and these twenty items were paired as the initial learning task. The second task (common to all groups) was to learn twenty sentences successively presented by a memory drum. The sentences consisted of the nonsense syllables and the name of a profession (for which the initial display item associated to the nonsense syllable provided a potential mediator).

Initial learning of the displays showed significant superiority of pictorial displays over verbal displays. Initial learning of displays showing overall SC provided significant improvement in learning the transfer task as did initial learning of pictorial displays. These results are related both to design of instructional displays and inferences concerning operations involved in learning.

Abstract No. 10 Daehling-Allen

THE LEARNING EFFECTS OF SEVEN VISUAL-VERBAL PRESENTATION MODES ON MAKING IDENTIFICATIONS AND COMPARISONS

William A. Daehling, Director
Learning Resources Center
Weber State College
Ogden, Utah

and William H. Allen
Professor, Department of Instructional Technology
University of Southern California, Los Angeles

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Statement of the Problem. The purpose of the study was to investigate the comparative effectiveness of seven visual-verbal presentation modes on the instructional objectives of *learning identifications* and *making comparisons.* The presentation modes under investigation were: 1) motion picture with spoken verbal, 2) silent motion picture, 3) still pictures with spoken verbal, 4) silent still pictures, 5) printed verbal with spoken verbal, 6) printed verbal, 7) spoken verbal. The seven visual-verbal modes were compared in seven different content areas with subjects classified as high, medium and low mental abilities.

Procedure. A 3x7 factorial design was used in the study, three levels of mental ability x seven visual-verbal presentation modes. The same design was used for each of the seven content areas and both learning objectives, making a total of 14 separate experiments.

The 617 fifth and sixth grade subjects used in the study were stratified into high, medium and low mental abilities (MA) from data obtained from standardized tests. A retention test was also administered to the subjects 10 days to two weeks following the post-test to determine the retention effects of the seven visual-verbal presentation modes.

Analysis of variance, two-way analysis of variance and Duncan's Multiple Range Test were the statistical tests employed.

Findings. The presentation modes produced significant differences in mean performance scores for combined MA_s.

Only one of 14 cases produced significant differences for the interaction of MA and presentation mode.

Multiple comparison tests for making identifications objective indicated the high MA S_s learned best from the print mode, the medium MA S_s learned best from the sound motion picture mode and the low MA S_s from the sound still picture mode. For the making comparison objective, the high MA S_s learned best from sound motion pictures.

By combining the mean scores for multi-channel modes and comparing them with the combined mean scores for the single-channel modes were superior in five of seven content areas for both objectives under investigation.

There were no significant differences among mean scores for the multi-channel modes for combined MA_s on the identification objective, however, for the comparison objective sound motion picture was superior in three of the seven cases.

Comparisons among mean performance scores for the single channel modes for combined MA_s showed still pictures the least effective mode and silent motion picture favored where differences occurred.

The retention test scores showed that most of the significant differences that appeared in the mean scores on the post-test at high, medium and low mental abilities disappeared at the time of the retention test.

Recommendations. The following recommendations may be made from the results of the study:

1. The instructional objective must be considered when selecting a mode of presentation.
2. The mental ability of the student must be considered when selecting a mode of presentation.
3. Multi-channel presentation modes should be used for all levels of mental ability upper elementary students for learning identification and making comparisons.
4. Silent still picture mode is the poorest presentation mode for upper elementary students to learn identifications and comparisons.
5. Additional study should be done in the area of presentation mode selection for other age groups of subjects.
6. Sound motion pictures are the most effective presentation mode for upper elementary school students in learning identifications and making comparisons.

Abstract No. 11 Russell

COMPARATIVE EFFECTS OF SEVEN VERBAL-VISUAL PRESENTATION MODES UPON LEARNING TASKS

Dr. J. Johnson Russell
Assistant Professor of Education
Humboldt State College

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Problem. The purpose of this study was to explore the comparative effectiveness of seven different instructional media visual and verbal presentation modes when used for teaching three learning objectives: classification, generalization, and the application of learning in new stimuli situations.

The broad goal of the study was to identify unique media characteristics and their relationships to specific learning objectives and learning characteristics.

Procedure. The design required the development of seven different visual-verbal presentation modes for each of seven different social studies and science films. The media presentation modes included: motion picture with and without spoken verbal, still picture with and without spoken verbal, print, print-spoken verbal, and spoken verbal. Seven performance tests were developed followed by try out phases to establish test procedures, make revisions and improve reliability of the tests. Six hundred and seventeen (617) fifth and sixth graders were selected from schools in the Bellflower Unified School District, Bellflower, California, and divided into three mental ability groups, then randomly assigned to one of seven presentation modes. Students were administered the specific content via a single presentation mode which was immediately followed by a performance test and a retention test two weeks later.

A two-way analysis of variance was used to test several hypotheses. This procedure allowed both variables to vary at one time; therefore, the effects of presentation mode, mental ability and their interactions were determined. A Duncan Multiple Range Test was also utilized to identify how test performance means differed when significant differences at < .05 level were found as a result of the analysis of variance.

Findings. The overall effects of the study tended to reveal definite but limited significant differences, at < .05 level, in performance scores as a result of the seven different presentation modes in each content learning area and learning objective. In general, single channel modes, i.e., print and spoken verbal, produced superior test performance results on the application learning objective while multichannel modes, i.e., still or motion picture with spoken verbal, were superior for the less abstract learning objectives of classification and generalization. This trend was consistent regardless of mental ability level in all of the content area films. The differences among presentation modes appeared to diminish from classification to the more abstract learning objective of application.

Specific media presentation modes were unique in their ability to produce superior test results depending upon the learning objective. The study suggested a hierarchy of learning objectives or mental operations with specific instructional presentation modes being superior in their teaching effectiveness at various levels. No significant findings were found for the interactions of mental ability and presentation mode.

Recommendations. Conclusions from the findings were generalized sparingly because replication is necessary to substantiate the results. Additional research in the following areas may assist in validating the findings in the study:

1. Simultaneous presentation of stimuli for concept learning tasks.
2. Presentation mode stimuli on single learning objectives over longer periods of time.
3. Determination of students' previous experience with mental operations for particular learning objectives.
4. Alternatives to hypothesis testing design in order to analyze more variables simultaneously.
5. Clear, concise and specific learning objective definitions to standardize factors for media design taxonomy.

Abstract No. 12 Dwyer

THE EFFECT OF STIMULUS VARIABILITY ON IMMEDIATE AND DELAYED RETENTION*

Francis M. Dwyer, Jr.
The Pennsylvania State University
University Park, Pa. 16802

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Instructional aids which utilize the visual medium are increasing greatly in number and kind. Many of these visual aids are complex and contain superfluous realistic detail. For instructional purposes too much information in a visual aid may prevent the learner from recognizing its primary message and thereby function to interfere with rather than facilitate optimum student learning. Since visual aids are being used by teachers rather arbitrarily in their classroom instruction, it seems that there is an imperative need for research to identify those basic instructional variables in different types of visual illustrations which have the capacity to facilitate student achievement of specific educational objectives most efficiently and economically. Once this objective has been achieved: (a) those unique characteristics in specific types of visual illustrations which should be employed to facilitate student achievement of specific educational objectives will be incorporated in their design; (b) the communicative potential of varied visual illustrations will be greatly improved since their predetermined design will permit them to transmit their message precisely; and (c) it will be possible for the classroom teacher to select specific types of visual illustrations which have been found to have a high degree of reliability in facilitating student achievement of specific educational objectives.

The purposes of this study were: (a) to compare the amount of immediate and delayed retention resulting from the use of black and white and colored visual illustrations to complement oral instruction; (b) to determine whether color in visual illustrations is an important variable in promoting student achievement of the five educational objectives measured in the study; and (c) to measure the effectiveness with which varied types of visual illustrations facilitate the achievement of twelfth-grade students on five educational objectives.

Procedure

The sample population for this study consisted of 262 twelfth-grade students. Because of absenteeism only 247 students were involved in the delayed retention testing. Students were randomly assigned by class to one of the nine treatment groups. The oral instruction was presented to the experimental treatments by means of a tape recorder. Each treatment group received a sequence of thirty-nine 2x2 inch slides specifically designed to complement the oral instruction. During the oral instruction an audio signal cued the instructor to change the slide so that the oral and visual portions of the presentation were synchronized.

Treatment Groups

The amount of realistic detail possessed by the slide sequences was varied for each of the nine treatment groups. Students in Group I received no visual illustrations but viewed printed words; Group II viewed abstract line illustrations (B and W); Group III viewed abstract line illustrations (Colored); Group IV viewed detailed, shaded drawings (B and W); Group V viewed detailed, shaded drawings (Colored); Group VI viewed photographs of a heart model (B and W); Group VII viewed photographs of a heart model (Colored); Group VIII viewed realistic heart photographs (B and W); and Group IX viewed realistic heart photographs (Colored). Each group viewed their slides for an equal period of time.

Criterial Measures

Each student in each treatment group received a physiology pretest, participated in his respective instructional presentation, and then received four individual criterial tests. Scores received on the four criterial tests were combined into a 78-item total criterial test. The students also participated in a delayed retention testing session 2 weeks later at which time they received the same test battery as that which they received for immediate retention. The

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objective of each test was as follows: (a) drawing test--to evaluate learning of specific locations of the patterns and positions of the parts of the heart; (b) identification test--to measure transfer of learning; i.e., the ability to identify numbered parts on a diagram of the heart from information received in the instruction; (c) terminology test--to evaluate student knowledge of referents for specific symbols; (d) comprehension test--to measure understanding of the heart, its parts, and its internal operations; and (e) total criterial test--to measure the student's total understanding of the concepts presented in the instruction.

Results

Analysis of covariance, utilizing pretest achievement on the physiology pretest, was used to determine the significance of differences in immediate achievement among the nine treatment groups on the criterial tests. In analyzing the differences between pairs of means in terms of instructional effectiveness and economy of production, the detailed, shaded drawing presentation (B and W) was found to be more effective than the oral presentation without visuals on the terminology test, comprehension test and total criterial test. The detailed, shaded drawing presentation (Colored) was found to be more effective than the oral presentation treatment on the identification test. On the terminology test and on the total criterial test, the detailed, shaded drawing presentation (Colored) was more effective than the detailed, shaded drawing presentation (B and W). No significant differences were found among the means of the nine treatment groups on the drawing test.

Delayed Retention

Analysis of covariance, with the use of the immediate total criterial test scores as the adjusting variable, revealed that significant differences existed among the means on the nine treatment groups on the terminology test. No significant differences were found to exist among the means of the nine treatment groups on the drawing, identification, comprehension, and total criterial tests. When an analysis was made of the differences between pairs on the terminology test, the abstract line presentation (Colored) was found to be more effective than was the oral presentation without visuals.

There are several reasons which may be cited in explaining the results obtained in this study (a) the additional stimuli contained in the realistic drawings and photographs may have interfered with the information to be transmitted, thereby reducing the effectiveness of the realistic photographs as efficient learning media; (b) students have been exposed to oral instruction in so many learning situations that, out of necessity, they have developed an ability to learn from oral instruction; (c) students have not been taught how to learn from realistic photographs, their exposure being merely to acquaint them with reality; and (d) students participating in this study viewed their respective types of visual illustrations for equal amounts of time which would put the realistic photographs at a disadvantage if we can assume that the accuracy and the amount of information that can be perceived in a visual illustration depends to a certain degree on the amount of time available for viewing.

The effectiveness of the detailed, shaded drawing presentation (Colored) on the identification test may be explained by the fact that since the realistic detail in the visuals was accentuated by color, the students were better able to make the appropriate discriminations and obtain the necessary information needed to achieve on the identification test.

The differential effects of the nine treatments disappeared on the delayed retention tests. Although it was found on the delayed retention testing that the presentations complemented by visual illustrations were no more effective than the oral presentation alone, considerable caution needs to be exercised in interpreting this finding. Since the retention tests were administered 2 weeks after the instruction and immediate retention testing, further research is needed in which the time lapse between the immediate and delayed testing sessions is increased to 4, 8, and 12 weeks before any definite conclusions can be made.

Abstract No. 13 Bullough

VARIATION OF INFORMATION PRESENTATION AS A METHOD OF ACCOMMODATING INDIVIDUAL DIFFERENCES

Robert V. Bullough, Sr.
Assistant Professor, Educational Media Center
University of Utah
Salt Lake City, Utah

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This study was conducted during the school year of 1968-69 and utilized as its population students from two high schools in the Granite School District in Utah.

The problem of this study was two-fold. Primarily, the problem was to determine the relative effectiveness of several different visual, visual-verbal, and verbal treatments when recall of various described and/or displayed attributes of the treatments was used as the principal criterion for measuring effectiveness.

Additionally, a second problem was to assess the relationship between the intelligence of the subject and his ability to solve verbally posited problems through visual means.

The design of the various treatments was based, for the most part, on what has been termed the "realism continuum." Basically, the treatments ranged from presentations which were highly visual to those which were highly verbal in nature. Treatment number one involved five full color paintings of imaginary animals without a congruent verbal descriptive presentation. Treatment two employed the same visuals as treatment one, but with a congruent verbal description of the five animals. Treatment three involved the same verbal description as treatment two, but the five animals were rendered in black and white halftone, and unlike the animals in treatments one and two, no indication as to the food or habitat of the animal was given. Treatment number four incorporated the same verbal presentation and the same five imaginary animals as were used in treatments one, two, and three, but in this treatment, the animals were rendered in black and white cartoon fashion. Treatment five was a simple outline (compressed) black and white series with congruent verbal description, while treatment six consisted of a verbal description of the animals with no accompanying visual presentation—this was the verbal only treatment.

The strategy of employing the imaginary animal and environment was used in an effort to preclude as much prior learning as possible and therefore to start all Ss as a more common point. Another factor considered was that of arousal. It was hoped that such a novel approach as that of using imaginary animals would be of greater interest to students than certain other more standard techniques might prove to be.

Names were assigned to the animals on the basis of labels which would not give away essential clues but which would nonetheless be somewhat meaningful. Numbers which are rather neutral were also used as an additional device for labelling the animals. Nonsense names were not used, for it was felt that to require the S to memorize a new term as an identification device would add to the confusion of correctly identifying one specific animal out of an array of animals.

The animals, grouped into treatments based upon the degree of compression of the animal, were presented to the Ss using a 35 mm Kodak carousel slide projector. A taped verbal description was presented concurrently in treatments two, three, four, and five; treatment one was visual only (with animal name titles), and treatment six was strictly verbal. The objective test instrument was then administered to the Ss immediately following the visual, visual-verbal, verbal presentation to test for recall of data shown and/or described. A delayed objective post-test after a two-week period of time to test for extended recall was then given.

The six treatment groups that were involved in the study were matched to the extent that equivalent ages and numbers of males and females were included. Such factors as socio-economic status and ethnic group membership were not considered. Each of the six heterogeneous treatment groups was further subdivided into three I.Q. groups in order that analysis of performance relative to scores/intelligence might be conducted. Relative effectiveness was determined on the basis of the amount of retention of factual data as measured by the objective testing instrument.

After the Ss had been exposed to the visual, visual-verbal, verbal treatments and had been given the immediate post-test, a second instrument was administered. This instrument was calculated to elicit responses from the Ss which would be based more on reasoning ability and imagination than on the ability to recall factual information. The instrument described a hypothetical environment, and the S was required to create visually an imaginary animal

capable of surviving this environment.

Responses were judged on a continuum from poor through superior by a panel of three judges who were specifically trained for this operation. The judgments were assigned numerical equivalents and the results tabulated. The scores were correlated with I.Q. measures in an effort to derive some kind of information on the role of I.Q. in the creative solution of verbally stated problems of this nature. The same instrument was used with all Ss and the results tabulated by the same group of judges. No attempt was made to assess artistic ability. Success in this particular phase of the study was based strictly on uniqueness and appropriateness of the response.

A two-way analysis of variance with repeated measures was computed in order that the interactions between the different variables might be determined. Correlations were also computed so that the relationships between other related measures might be assessed. The statistical design of this study was one of repeated measures on subjects in a 6 x 3 x 2 x 4 factoral design (six treatments x three I.Q. subgroups x two periods of testing x four measures).

The prediction that the ability of a subject to visually solve a problem in verbal terms (with the emphasis on creativeness of response) would not be significantly correlated with I.Q. was substantiated.

A significant difference ($p = .01$) was found to exist between the six treatment groups across all eight measures (food, environment, color, other attributes, immediate and delayed post-tests). The mean for treatment number six, the verbal only treatment, was lower by 3.141 points than the mean which was derived from treatment number two, the high fidelity visual-verbal treatment (treatment two mean = 11.008; treatment six mean = 7.867).

The difference between the total means based on the six treatments was found to be significant for the three I.Q. groups ($p = .01$). This finding supported the hypothesis that a positive correlation would be found between the retention of factual information and the I.Q. level of the subject.

It was postulated that the high fidelity, full color visual-verbal treatment would produce higher scores on the questions specifically related to color than would any of the other treatments. This hypothesis was substantiated ($p = .01$).

It was also found that students who were exposed to the high fidelity, full color visual-verbal treatment where the attributes of food and environment were displayed scored significantly higher ($p = .01$) on questions specifically related to these attributes than did students who were exposed to the other treatments.

It was postulated that because the nature of the stimulus materials used in this study was so very visual, the verbal only treatment would produce lower test scores throughout all I.Q. ranges than would the other treatments. Significance ($p = .01$) was found to exist relative to this hypothesis.

The difference in the combined means between the immediate post-test and the delayed post-test was found to be significant at the .01 level.

The hypothesis that delayed recall would be greater for the upper I.Q. students involved in treatment two than for those involved in treatments other than two was not substantiated.

The hypothesis that delayed recall for all visual-verbal treatments would be greater than for either the visual only or verbal only treatments was only partially substantiated. Although treatment six, the verbal only treatment, was lower than all visual-verbal treatments, treatment one, the visual only treatment, was not. The mean for treatment one was greater than the mean for treatment five (the compressed black and white outline treatment with verbal).

Abstract No. 14 Fleming

AN ANALYSIS OF RECENT PERCEPTUAL RESEARCH LITERATURE AND THE DERIVATION OF PRINCIPLES FOR THE DESIGN OF INSTRUCTIONAL MATERIALS

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Malcolm Fleming
Division of Instructional Systems Technology
School of Education, Indiana University
Bloomington, Indiana 47401

Purpose

It was contended that specifications for instructional materials (objectives, media, etc.) leave many judgments to the designer of the materials, that the designer makes these judgments largely without reliable research evidence, that such evidence from perceptual research has not been available to him in his own language. Consequently, the objectives of this study were:

1. To search the recent perceptual research literature,
2. To analyze selected relevant parts of that literature,
3. To derive tenable principles and generalizations that can be used by practitioners who design instructional messages,
4. To disseminate the results to appropriate audiences.

Procedures and Results

The perception literature since 1960 was searched, primarily in secondary sources. From these sources over sixty perceptual principles were selected. Various implications of each principle were considered, and examples of possible applications to instructional design were generated. Principles, implications, and examples were arranged in elemental to complex order and a draft of the report was written. This draft was submitted to four consultants, perception researcher and message designers, for critical review. The final report reflects their evaluations.

Implications

It is expected that the sixty principles derived from research literature and disseminated to designers of instructional materials should make it possible for the designer to be a more knowledgeable participant on a development team. He will be able to make more design decisions with reference to research evidence. The consequences extend to the numerous learners who will encounter the new materials.

Abstract No. 15 George

MODE OF PRESENTATION AND COMPREHENSION OF COMPRESSED SPEECH

Robert Glen George
Assistant Professor of Education
Indiana State University
Terre Haute, Indiana 47809

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While there have been numerous listening studies in the past that have explored the many aspects of auditory reception, there appears to be a real paucity of studies regarding the value of using headsets in the listening process. In fact, the author could not find a single study that compared headsets to a public address system in the listening process. This dearth of knowledge regarding headset value has led to some controversy in the study of compressed speech.

Currently the two leading centers for research in compressed speech are located in Louisville, Kentucky, under the leadership of Emerson E. Foulke, and in Washington, D.C., under the leadership of Herbert L. Friedman. Foulke, a recognized leader in the area of compressed speech, uses headsets in most of his studies. Friedman and his associates, however, are using public address systems. The question arises then as to which is the better of the two methods employed by the leading centers for research.

Therefore, this author chose to explore the situation by asking these research questions:

1. Does mode of presentation have an effect on comprehension of compressed speech?
2. Does rate of presentation have an effect on comprehension of compressed speech?
3. Is there an interaction between these two variables?

Procedure

Sixty-four university freshmen were assigned to eight groups of eight to listen to compressed speech materials from the Nelson-Denny Reading Test, Form A. The mode of presentation and rate of presentation differed for each group. The groups were randomly assigned to listen to stimulus materials via one of two modes of presentation: individual headsets or a public address system. The rate of presentation was 175, 275, 325, or 375 words-per-minute (wpm). Immediately after listening to the material the subjects responded on a 36-item multiple-choice test. An analysis of variance was performed on the data.

Results

The variable of mode of presentation did not produce a significant difference at the pre-set level of .05.

The variable of rate of presentation had a significant effect ($p < .05$) upon comprehension. Further analysis via the Duncan Range Test disclosed that the mean for the rate of 175 wpm was significantly ($p < .05$) greater than any of the other three rates. It was also found that the mean for the rate of 275 wpm was significantly ($p < .05$) greater than the rate of 375 wpm. However, the rate of 275 wpm was not significantly greater than the rate of 325 wpm, nor was the rate of 325 wpm significantly greater than the rate of 375 wpm.

There was not a significant interaction between the mode of presentation and rate of presentation.

Discussion

The finding of no significant difference due to mode of presentation was of most interest in this study for two reasons. First, the controversy over the best mode of presenting compressed speech material should be nearer resolution. And secondly, since individual headsets did not prove to be significantly better for comprehension than the public address system, it would appear that the problem of mode of reception of compressed speech in a classroom no longer presents a problem.

The finding of a significant difference due to the rate of presentation is in keeping with the previous findings of Reid (1968) and George (1969).

Abstract No. 16 Jones-Zachert

PROGRAMMED PATHOLOGY MATERIALS IN A COORDINATED MEDICAL SCHOOL CURRICULUM

Margaret Jones
Medical College of Virginia
Richmond, Virginia*

and Virginia Zachert
Medical College of Georgia
Augusta, Georgia

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The curriculum at the Medical College of Virginia was departmentally-based and taught by disciplines until 1964. In that year, an interdisciplinary curriculum was developed and thereafter subject matter was taught by systems. During the first phase the "normal" was emphasized, while introduction of the "abnormal" or disease states was largely delayed until the second phase.

In particular subjects, such as the central nervous system, the separation of normal and abnormal proved to be arbitrary and unworkable. More interesting to the students was an approach which integrated normal with disease states at all levels. This approach gradually evolved so that the differences between the central nervous sytem courses was no longer qualitative. These changes required further integration of the two courses and even suggested the possibility of their merger, in keeping with the national trend toward core curricula. The latter generally consisted of a sequence of fully integrated subjects presented only once to an entire class.

Simultaneously, in an effort to present the normal more meaningfully, topics of "pathogenesis" introduced in the second phase were interwoven with the subjects of the first phase. Topics were not closely or naturally related to the subjects in all cases. Moreover, the vocabulary and concepts necessary for understanding the topics were largely non-existent in an entering medical school class.

In addition to these developments, other significant changes occurred in the medical student population itself which demanded attention. Many factors fostered early sophistication and potential for teaching at the medical student level. These factors included their interest in medical education, their responsible roles in curriculum committees and their elective year. At the same time, research experience which is necessary for the development of thoughtful clinicians, became limited because of curtailment of federal funds for basic science and clinical investigations while research opportunities in medical education expanded.

The type of instructional materials to solve these curriculum problems was decided upon after consultation with the Learning Materials Division of the Medical College of Georgia. Programmed materials were evolved because it was possible to accomplish the objectives of integrating new vocabulary, concepts and clinical material with the subject matter by this means.

The following objectives were also accomplished by programming the materials. Students themselves actually wrote the programs and were thus able to *participate actively in curriculum design and teaching.* Furthermore, evolved materials permitted other students to *participate actively in their own learning experiences.* While the latter is implicit in the design of all programmed materials, the former is incompletely realized in most.

For several reasons, the central nervous system portion of the first phase of the curriculum was selected as an ideal place to begin merger of the two phases and to introduce pathogenesis topics previously taught during the second phase. One reason was the nature of the central nervous system subject matter which logically relates structure, function and disease. Another reason was that a number of self-instructional carousels of kodachromes, written materials, audiovisual tapes and laboratory materials which coordinated normal and disease states had been successfully used and enthusiastically received during both phases. (These were developed independently by the Divisions of Neuropathology and Neurology as well as the Departments of Anatomy and Radiology.) Further instructional materials, designed to solve the curriculum problems outlined above, were therefore developed in the following manner.

Behavioral objectives, designed by a pathology resident from two sets of guidelines keyed to a standard textbook by the Departments of Pathology at the Medical College of Virginia and Albany Medical College were subsequently submitted to the pathology staff. Through independent study and consultation with the pathology staff, a medical student previously unacquainted with these objectives proceeded to acquire sufficient background to program a particular topic. These programs were read, timed and corrected by other students.

The corrected programs were finally revised by the pathology staff and program coordinator. Programs

*Present address: Department of Pathology, Michigan State University, East Lansing, Michigan 48823.

were printed by the Department of Visual Education and distributed to the Freshman students with a set of test questions and a questionnaire. Students were instructed to use the questions as a guideline for independent study. Completion of the program during an allotted time was suggested as one means of achieving required competence.

During the first six months of this project, the following programs were written and most were distributed to 128 Freshman students. Those related to the central nervous system included: 1. Introduction to embryology and developmental disorders of the nervous system; 2. Clinical anatomy of the eye and bony orbit (revised); 3. The limbic lobe; 4. Inflammation of the central nervous system. Programs for the pathogenesis topics were: 1. Inflammation and repair; 2. Chemical and physical injuries; 3. Degeneration and necrosis; 4. Neoplasis (including other disorders of growth); 5. Fluid derangements; 6. Hemorrhage, thrombosis and infarction; 7. Metabolic diseases and 8. Introduction to infectious diseases.

In the absence of pre- and post-test data from the initial phase of this ongoing project, a number of subjective impressions were formed: 1. The programs represented another learning modality in addition to lectures, laboratories, self-instructional carousels of kodachromes; written materials and audiovisual tapes, which further integrated the two phases of the curriculum and individualized instruction for a sizable segment of students; 2. Integration of new material was enhanced but not fully achieved in the remainder of the subjects by the programs; 3. The experience suggested that roughly and quickly generated programmed learning materials are of value in a setting of constant curriculum change; 4. Medical students were able to participate actively in teaching and learning and critical faculty time was extended. Finally, it is recommended that research opportunities for medical students in medical education be expanded in order to develop well-qualified teachers as well as thoughtful clinicians who won't view "research" as a pursuit opposed to "teaching."

Abstract No. 17 Caput-Sparks

A STUDY TO DESIGN, PRODUCE, AND EVALUATE A SYSTEM OF AUDIO-VISUAL COMMUNICATION FOR GENERAL PRACTITIONERS OF MEDICINE

Diana Z. Caput
Director of Research, MIP

and Ronald J. Sparks
Producer/Writer, MIP
Department of Instructional Technology
University of Southern California

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The Medical Information Project, a joint research and development project by the School of Medicine and the School of Education of the University of Southern California, was an attempt to design, produce, and evaluate an audio-visual communication system for 100 general practitioners in eleven western states. In the three and one-half year study, funded by the U.S. Public Health Service, MIP explored the communication potential of individualized audiovisual programs on fifteen medical topics presented by a device synchronizing projected still pictures and recorded narration.

The problem of the so-called explosion of knowledge has become the subject of much concern and study in recent years. This problem has long been particularly acute in the medical profession, with new information, concepts, theories, and even whole new fields of operation continuing to invade the field. A case in point is the practicing physician who faces the difficult and complex problem of attempting to keep abreast of the advancement of medical knowledge.

The information explosion is particularly serious for the general practitioner who is busier than ever before. Cahal (1962) stated that the general practitioner sees an average of 190 patients in a typical five and a half-day week, during which he works about 60 hours per week. It is obvious that the time that physicians can devote to postgraduate education is limited. Various attempts have been made to partially digest available information through the use of technology, all of which have helped, but none have really closed the information gap.

In an effort to solve the problems of information and time, MIP assumed that: (1) the GP is overwhelmed by the mass of printed materials which he probably should read, (2) he is too busy to read what he should, and (3) he is deterred by other factors such as time involved, inconvenience of scheduling, travel, and cost from many types of postgraduate education.

The MIP approach involved three basic principles: (1) the information should be presented by audio-visual means, (2) the communication should be individualized, and (3) where possible, content should have some elements of programing involving the viewer with the content. One of the first jobs, therefore, was to locate, evaluate and select from existing devices. The display device adopted for use by the project was the Hoffman Mark IV Audio-Visual Projector, slightly modified in its programing function. This device has a screen approximately 5x8 inches and combines a filmstrip encapsulated in a sprocketed plastic holder (14, 35mm frames/strip) with audio provided by a disc recording which has an inaudible automatic advance signal. Each side provides up to 6½ minutes of playing time. The projector has two modes of operation: Automatic Advance and Automatic Stop. It allows for a form of programing in that the program can be automatically interrupted at any time to request an overt response to a question. The program is then resumed when the restart button is pushed.

Materials were tested on a sample of 100 general practitioners. The population from which the sample was drawn was defined as GPs in eleven western states who were in full-time practice, were under 65 years of age, and did not limit their practice to a single area of interest. A disproportionate stratified random sample was drawn to assure that rural physicians would be included in the study. A control group of 100 GPs was drawn on the same basis.

The development of the system involved three general phases: the Preliminary or Design Phase, the Program Delivery or Experimental Phase, and the Evaluation Phase. During the course of the experimental phase, the participating physicians were asked to complete pre- and post-program questionnaires covering their usual methods of obtaining medical information, such as medical meetings, journals, courses, etc. as well as other factors that might be related to their communications behavior such as distance from medical school. In addition, a number of the participants were interviewed. Fifteen content programs were produced and mailed to the participants at the rate of about one per month during the period from April, 1968 to August, 1969. After viewing the programs, each physician was asked to complete an evaluation form on that program and a short content test. The control group of GPs were

asked to complete the same pre- and post-program questionnaires and the content tests.

The preparation of fifteen audiovisual programs designed for these GPs was an exacting and difficult task. It involved the transformation of complex medical and scientific knowledge into a concise and vigorous presentation. The general content areas from which the specific program topics were selected were established by the Advisory Committee, composed of distinguished physicians in the Los Angeles area. Topic areas were chosen on the basis of importance to the GP and possible positive effect on the immediate practical implications for the physician's medical practice. A consultant was recommended by the committee for each topic. An initial meeting was set up with the consultant and the project producer at which time behavioral objectives were defined in terms of what the physician should be able to do after viewing the program; what points of knowledge he should take away from the program. The consultant recommended sources of information from which the topic could be researched and a content outline written for the rough script and storyboard. The first draft of the script and storyboard would be completed and reviewed with the consultant.

Each program was validated with a panel of from 3 to 5 physicians in the Los Angeles area. The method used and which proved most feasible in terms of time, expense, and response from the physicians was white chalk on chalkboard which were photographed on black and white film. The negatives were then mounted in 2x2 slides. The resulting projected image was a dark line on a gray background. These slides were accompanied with an in-house taped narration. Question and answer frames, program questions, as well as content tests were included in the validation procedure.

After revision, re-testing, and final approval by the consultant and Advisory Committee, the program went into the final production stage. When the visuals were completed, and the script finalized, the finished product was sent to commercial companies for reproduction. The narration was professionally recorded, records pressed and pulsed, and labels printed. Filmstrips were printed, looped, cut at appropriate intervals, and encapsulated. Program booklets were printed and collated.

When all the components for a given program were reproduced and returned to the production staff, a quality control check was undertaken. After this check, the packets were assembled. The albums usually contained the following items: (1) four filmstrips, (2) two records, both sides labelled, (3) program booklets, containing program questions, evaluation form, and content test, (4) postcard requesting further information, and (5) self-addressed return envelope for return of forms. Once assembled, the packages were mailed to the participating physicians.

In evaluating the feasibility of the system, three questions were posed: (1) Did the communications behavior of the GPs change? (2) Did they learn? (3) Did they find the system acceptable in terms of their needs? Affective and cognitive reactions were obtained from questionnaires, evaluation forms, interviews, and content tests. To achieve anonymity of responses and at the same time to keep record of who responded, these forms were number coded.

Examination of the data provided from pre- and post-program questionnaires seemed to indicate that no significant changes in communication behavior occurred, although no elaborate analysis of this data was performed. Comparison of the mean scores on the content tests between control and experimental groups yielded a significant difference between means beyond the .01 level of confidence. Factors which the physicians liked most about the system were: convenience of time and place, condensation of material, combination of audio and visuals, and ability to review if needed. Factors which they liked least about the system were: choice of content topics, level of the content, and negative aspects of the machine.

In general, it was concluded that there was no change in communications behavior; that such a system would supplement existing methods and sources of information rather than replace them. Physicians do learn from this method of presentation. Such a system would be viable particularly where the physicians would have a choice in the selection of the content they would view, and if the equipment were more reliable. Ultimately, of course, the goal of all continuing education is the improvement of medical care. However, it was not within the purview of this study to measure the effect of this type of system on the physician's medical practice.

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Abstract No. 18 Everly, Burger, and Steele

THE EFFECT OF MEDIATED ENGLISH COUNSELING VIA AUTO-TUTORIAL METHODS ON THE WRITING OF RESEARCH REPORTS IN A BASIC FIELD CROPS INSTRUCTIONAL SYSTEM

J. C. Everly,* A. W. Burger and J. C. Steele
University of Illinois at Urbana-Champaign

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How well can mediated English counseling help agricultural students in writing research reports for their class? Is this the correct time for learning? Is this wise use of limited resources?

The opportunity to explore these questions and others presented itself when a programmed field crop science laboratory teaching system was initiated at the University of Illinois using auto-tutorial methods. The laboratory procedures incorporated the use of 13 auto-tutorial units for independent study with a unit assigned each week in carrels operated by the department.

Because of the auto-tutorial facility, each student gets his own tutorial critique of his original research report in the form of a tape cassette from the College of Agriculture English Counseling Service. After listening to the tape in the carrel the student rewrites his report with any changes he desires on a ditto master. His paper is then published and distributed to the other 25 members in his laboratory. He then makes a five-minute oral report to this peer group and defends his report.

Data–Attitude was measured with a semantic differential instrument using a 7-point scale with 10 pairs of adjectives for each concept. A favorable attitude change from pre- to post-tests was observed for (1) auto-tutorial instruction, (2) every student's research report published, and (3) the use of taped comments on the research report. Freshmen spent more time in the independent learning environment than sophomores, juniors and seniors and they increased their performance in the research report writing the most of any group and were able to successfully compete with older class members. Students who made A's or B's as a final grade spent considerably more time in independent study than those making lower grades. Students enrolled in agricultural communications and agricultural science curricula spent more time with the auto-tutorial units than those in the core agriculture curriculum. Students with low to medium ACT English scores did improve the grade of their research report more than students with the high ACT English scores. Students with a medium grade point average improved their research report grade the most.

*Dr. Everly is coordinator of Instructional Resources, Office of Agricultural Communications, College of Agriculture, University of Illinois.

Abstract No. 19 Brucker

THE EFFECTS OF AN ENCLOSED INDIVIDUAL LEARNING ENVIRONMENT INTERACTING WITH TWO PERSONALITY TRAITS ON THE ACHIEVEMENT AND OPINIONS OF COLLEGE STUDENTS LEARNING THROUGH THE USE OF PROGRAMED INSTRUCTION

Paul J. Brucker
Assistant Professor of Health Communications
Medical College of Georgia
Augusta, Georgia

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This study was designed to investigate the effects of an enclosed learning environment on the achievement and opinions of subjects with varying degrees of two personality traits designated as anxiety and permeability. The following questions were posed to structure the investigation.

1. Does working in an individual learning carrel retard or enhance a person's achievement in learning factual material and/or affect a person's opinion regarding the mode of instruction?
2. Does the degree to which a person exhibits certain personality traits hinder or encourage his achievement in learning factual material and/or affect his opinion regarding the method of instruction?
3. Is there a relationship between the degree to which a person exhibits certain personality traits and his reaction to an individual learning carrel?

The study was conducted at Indiana University, Bloomington, Indiana, during the spring semester of 1969. Subjects were predominantly elementary and secondary education majors in the final semester of their senior year.

Eighteen null hypotheses were formulated and tested for tenability. The first three of these predicted that there would be no significant difference in the amount of factual knowledge achieved for those subjects grouped on the personality trait, anxiety, because of learning environment or degree of anxiety or the interaction of the two. The next three predicted no significant difference in the amount of factual knowledge achieved for those subjects grouped on the personality trait, permeability (extroversion-introversion), because of learning environment or degree of permeability or the interaction of the two. Hypotheses seven through 12 predicted no significant difference in the amount of factual knowledge achieved on a delayed retention test for those subjects grouped on anxiety or for those subjects grouped on permeability because of learning environment or degree of personality trait or the interaction of the two. The next three hypotheses, 13, 14, and 15, predicted that there would be no significant difference of opinion toward the individualized instructional mode between those subjects grouped on anxiety based on the learning environment, degree of anxiety, or the interaction of the two. The final three null hypotheses repeated the last three mentioned for subjects grouped on permeability.

Procedure

The experimental design consisted of two randomized blocks designs with subjects being blocked on personality to degree (high or low) and randomly assigned to environmental treatments (enclosed or open).

The Sixteen Personality Factors Questionnaire was administered to every subject to determine the degree to which they exhibited the personality traits of anxiety and permeability. The subjects were ranked from highest to lowest on the basis of their anxiety scores and a median split was performed to render a high anxiety group and a low anxiety group. These two groups were then randomly assigned to each of the two environmental treatments. All subjects were then ranked from highest to lowest on the basis of their permeability score and a median split was again performed. Since subjects had already been assigned to treatments, the experimenter randomly eliminated subjects from certain groups to achieve equal n's.

Three separate measures were obtained for each subject. The first two measures were an immediate achievement test score and a delayed retention test score based on the amount of factual information each subject gained from a set of programed materials concerned with the utilization of audiovisual materials and equipment. Both the test and instructional program were modifications of materials developed by Dr. George Yeamans at Ball State University, Muncie, Indiana. The third measure consisted of a score on an opinion questionnaire which reflected the subject's opinion about the learning experience he had just undergone. The opinionnaire was developed by the experimenter and took the form of a "Likert-type" scale.

The difference of means between groups was tested for significance by the analysis of variance. The .05

level of confidence was set as the criterion for rejecting the experimental null hypotheses.

Results

1. While neither the subjects grouped on anxiety nor those grouped on permeability were measurably affected on immediate achievement or delayed retention scores by the variable of environment, it was apparent that high anxious subjects obtained significantly lower scores on these two measures than low anxious subjects.

2. There does appear to be a significant relationship between environment and personality as evidenced by achievement scores for subjects grouped on anxiety.

3. There were no significant differences of opinion toward the individual instructional mode attributable to the variable of environment regardless of whether the subjects were grouped on anxiety or permeability, however, subjects who were listed as high anxious had significantly less favorable opinion toward the individualized instructional mode than did low anxious subjects.

4. An interaction between environment and personality was not reflected in the opinionnaire scores.

Discussion

Calvin S. Hall, in his book *Theories of Personality*, has noted that Sigmund Freud felt that the dynamics of personality is to a large extent governed by the necessity for gratifying one's needs by means of transactions with objects in the external world. The environment contains regions of danger and insecurity; it can threaten as well as satisfy. The environment has the power to produce pain and increase tension as well as bring pleasure and reduce tension. It disturbs as well as comforts. The experimenter feels it was not the intent of this study to get involved with psychoanalytic theory. However, it is interesting to note that even though the variable of environment did not in and of itself measurably affect immediate achievement or delayed retention, there does appear to be an interaction between personality and environment regarding these scores for subjects grouped on anxiety. The apparent reason for this interaction lies in the fact that subjects who were highly anxious and worked in an enclosed environment were not able to perform as well as any of the other groups. It is also apparent that persons working in the enclosed environment who were judged low anxious did slightly better than any of the other groups. This would appear to reinforce the idea that it is not environment alone but, in this case, the combination of environment and personality that produced the differences in test scores.

The largest loss of information between the immediate achievement test and the delayed retention test again shows up in the high anxious subjects working in an enclosed environment. This would seem to indicate that not only do these persons perform poorer initially, but that the information they do learn is not learned as well as the subjects in other groups.

As concerns the subjects' opinions toward the learning experience, the results are somewhat similar to those on the criterion tests with one notable exception. Although there is a difference between high and low anxious subjects, there is no significant interaction between anxiety and environment. This indicates that high anxious subjects have a less favorable opinion than low anxious subjects toward the individualized learning experience regardless of immediate environment. However, the between environment analysis produced an F ratio which was almost significant. This would seem to point out that students in general are more concerned with their environment than their achievement scores would suggest.

Abstract No. **20** Short

DEVELOPMENT OF A SELF-INSTRUCTION LABORATORY INCLUDING CAI, COGNITIVE AND AFFECTIVE TESTING

Sarah H. Short
Assistant Professor
College of Home Economics
Syracuse University

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Purpose

Because of the increased number of students, the knowledge explosion, and the press for space, the Department of Nutrition and Food Science at Syracuse University decided to initiate a self-instruction method of teaching in the beginning food science course. This course was chosen because of the extent of individual differences in skills and experience brought by the students to this class. The beginning nutrition and food science laboratory had been taught using self-instruction methods beginning in the fall of 1967-68. The purpose of this study, then, was to determine the feasibility of teaching an entire beginning college nutrition and food science course using audio tapes, integrated with films, slides and computer assisted instruction.

Procedure

The subjects for this study were 60 students enrolled in the Nutrition and Food Science 115 class during the fall semester, 1969, at Syracuse University, College of Home Economics. Within this sample, the students were randomly assigned to either a live lecture group or to the experimental group.

The first lecture consisted of a multi-media introduction to the course and to the instructor using psychedelic films, slides, strobe lights, black lights and taped music to arouse interest in the subject. During the first week of the semester all students completed a 100 item pretest covering the lecture material, and a pretest of the material that would be presented in the food laboratory.

Affective changes were measured by use of a semantic differential at the beginning and end of the course, and a Moods Adjective Checklist given before and after the first lecture, the first examination, the first self-instruction laboratory and the first computer assisted instruction. A Likert-type scale was administered at the end of the semester and a personal questionnaire was given during the semester. Comment cards were filled out by the students during each unit of instruction. Cognitive tests covering lecture material were given four times during the semester, plus a final examination. Post tests covering food laboratory material were given immediately following each self-instruction unit.

The taped lecture material was developed from lectures given by the instructor over the past three years. The live lectures were delivered using the scripts from the taped lectures. Film loops were produced in the Department of Nutrition and Food Science under the technical supervision of the Center for Instructional Communications. The filmstrips were purchased commercially and adapted for colleg use by means of taped comments. Slides were made under the instructor's supervision. For each unit of instruction during the semester, the instructor prepared flow sheets, presenting a schedule to be followed for that time period; information sheets to go with the film loops and slides, making note taking unnecessary; plus worksheets containing objectives, a lecture outline, and questions to be answered.

After the first introductory week of testing and instructions, the class was divided randomly into two sections. The traditionally taught group was given two 50 minute lectures a week. The experimental group listened to taped lectures integrated with film loops, filmstrips, slides and computer assisted instruction at their convenience. Both groups attended one food laboratory session per week of approximately three hours duration. Both groups viewed the same film loops, slides and filmstrips covering procedures for preparing a product in the food laboratory, but the traditionally taught section viewed this media immediately before the food laboratory. The experimental group viewed the media as part of the taped lecture experience. This may or may not have been just before the food laboratory depending upon the time schedule the student had set for himself.

To allay the fears of the students in the experimental section concerning student-instructor interaction, the students were given phone numbers where the instructor could be reached at any hour of the day or night. The students could make appointments to see the instructor or ask questions by phone.

The computer assisted instructor program was written by the instructor in APL (A Programming

Language). Information was given by the computer to the student and then depending upon his answers, the program branched out to other questions or other information. The students had full use of two telecommunications terminals linked to an IBM 360 model 50 computer in the Computing Center Building on the Syracuse University campus.

The self-instruction laboratory itself consisted of ten carrels, each equipped with a Wollensak 1520 AV model tape recorder with earphones, a Standard FS 333C filmstrip-slide projector and a Technicolor 1000 super 8 cartridge projector.

Results

On the basis of evidence collected in this study, it would appear that students listening to taped lectures integrated with media learn the principles presented in this course as well as those listening to live lectures. There was no significant difference between the two groups on cognitive tests but there was a trend toward better scores from the experimental group. The standard deviations of the experimental group were consistently much higher than the traditionally taught group and the experimental group received all of the A's and all of the D's in the class. This may indicate that self-instruction methods divide the group into those who are able to self-pace themselves and those who cannot do so.

The Semantic Differential measurement showed very little significant difference between the two groups toward four concepts related to the course. The experimental section was lower in their evaluation factor of the course, but the scores on all factors were quite high at the beginning of the course. The students' moods changed drastically during the first multi-media lecture. Students' anxiety, skepticism and fatigue decreased while social affection and happy mood increased. There was no significant change in affective domain during the first self-instruction laboratory. The only mood that changed during the first examination was that anxiety and concentration were less at the end of the test. The experimental students' anxiety levels were lowered during the computer assisted instruction.

The Likert-type scale results indicated that 70-80% of the experimental students liked the self-instruction method, would recommend the course, liked being able to self-pace themselves, believed that objectives were clearly defined, liked having the responsibility of scheduling and would take the self-instruction method if allowed to start over again.

Very few students wanted or needed much personal instruction time on a one-to-one basis. During the entire semester only eleven students wanted to see the instructor for a total of 4 hours and 46 minutes and only four made more than two appointments or phone calls.

The students who spent more time in the self-instruction laboratory seemed to be the ones who earned higher grades. This data is unreliable since the students were free to come and go and filled out their own laboratory time cards.

The students did learn from the media, since 95 percent of them failed the pretest covering information presented in the media while 95 percent passed (80 or above) the post-tests given after each unit.

The results of the cognitive and affective tests indicate that the self-instruction method of teaching is one solution to the problem of teaching and learning beginning nutrition and food science.

Abstract No. 21 Snow

AN ANALYSIS OF THE DOCTORAL LEVEL PREPARATION PROGRAMS IN THE FIELD OF INSTRUCTIONAL TECHNOLOGY AT SELECTED INSTITUTIONS

G. Gardner Snow
Associate Professor, Teacher Education
Brigham Young University
Provo, Utah 84601

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The higher education institutions selected as the population sample for this study are those that comprise the University Consortium in Educational Media and Technology. They are the University of Southern California, Michigan State University, Syracuse University, Indiana University, and the Oregon System of Higher Education. Inasmuch as the Oregon System does not have a doctoral level program in Instructional Technology, it has not been included in the study.

The purpose of the study was to gain some insight into the kinds of competencies and experiences that are needed by professional people, at the doctoral level, in the field of instructional technology. With this augmented insight an indication of some of the elements of an optimum preparation program has been made.

A number of different levels of information were needed before making this kind of discrimination.

First, the current status of preparation programs for the professional level person in instructional technology was made. This information was obtained from careful perusal of the general catalogs, special catalogs and brochures, class outlines and handouts, and other kinds of promotional material received from the institutions included in the study.

How do the people in the field perceive the preparation program for instructional technologists at the doctoral level? What, in their opinion, are the most significant elements of this kind of program? This was the second phase of the study. Responses to a written questionnaire were statistically treated to ascertain if there was consensus among groups and among the individual respondents. There was. The responses were also checked to determine if there was a hierarchical ranking of the elements, according to perceived importance by the responding groups. Again, there was.

To temper the indicated program proposals derived from the first two sources of data a third set of factors were introduced into the study. These were the recommendations of "scholars," "innovators," and "philosophers" working in the field. The intent of this addition was to make reasonable allowance for averages in the response patterns, but also to prevent the obvious in "equating averages with oughtness."

Conclusions

The following conclusions were reached using this threefold data base.

1. There is limited variation in the doctoral preparation programs in instructional technology at the four institutions included in this study. This difference is largely in organizational pattern and the breadth of course offering included under the aegis of the Department of Instructional Technology rather than a difference in the program content.

2. Experiences that are provided within the preparation programs are similar. The course numbers, titles, and catalog descriptions vary from one school to another, but there is notable correspondence in terms of the overall objectives of the preparation programs.

3. Admissions requirements are analogous for the four universities. The key points are: a bachelor's degree as the beginning point, a grade point average ranging from 2.50 through 3.25 and a preliminary examination. Previous teaching experience is required by two of the universities but is only suggested by the other two. Personal interview is suggested by two of the schools, and is stipulated by the other two.

4. The statistical treatment of the scaled responses to the questionnaire indicated that students, graduates, and members of the teaching-administrative staff from the universities are in accord concerning the elements of an optimum preparation program. The One-Way Analysis of Variance test of each of the items did not show any significant difference on forty-two of the forty-five proposed items. To pin-point the source of difference in the three items, the Newman-Keuls Sequential Range Test was applied. This showed that the differences were between the student/graduate groups from each of the schools, rather than between staff and students, as might have been expected. Kendall's Coefficient of Concordance showed high concurrence among all the groups in the ranking of the

elements proposed. (0.8425).

5. Students, graduates, and staff members rank learning and communications theory, systems theory and design, educational psychology, research method and design, selection and use of instruction materials and media equipment, the administration of media facilities, and curriculum design and development as being "highly desirable" elements in the preparation program. These should be developed at both the *knowledge* and the *skill* levels.

6. The internship in instructional technology, an overview of media materials and equipment, methods and techniques of classroom television, programmed instruction, the design of media facilities, and previous teaching experience were rated more in the "desirable–not essential" ranking. In the "useful" category, were the "tool" kinds of experiences such as still photography, television production, statistics, cinematography, and business administration. Cautions were expressed by many of the respondents relative to placing too much emphasis upon the "machine" portion of the "man-machine system" known as instructional technology. Again, emphasis should be given to the development of both *knowledge* and *skill*.

7. There was almost universal agreement in indicating that the foreign language requirement for the doctoral degree is inappropriate. The relatively low ranking of the items relating to library science and library cataloging and filing was also of interest.

Implications

It is recommended that:

1. Funds and time be provided for those who do the actual instruction to meet together to discuss their programs and to begin working out some of the suggested details for achieving the objectives of the University Consortium in Educational Media and Technology. It may well be that students in the advanced graduate program can make significant contributions to this kind of instructional development.

2. Provisions be made to permit advanced graduate students to work in programs that are not hampered by the confines of traditional course organization and the relation of formal courses, seminars, and independent study.

3. A reassessment of the role of the Department of Instructional Technology within the College of Education specifically, and the total university generally, be made. This evaluation has a number of facets. One is a survey of the internal relationships that exist between and among the courses and instructors who are assigned directly to the Department of Instructional Technology. The other would involve the relationship of Instructional Technology to other departments within the College, i.e. curriculum, administration, special education, reading, teacher education, and media.

4. The requirement for a foreign language competency be dropped for the doctoral level degree in Instructional Technology.

5. The relationship between Instructional Technology and Library Science be investigated. The ostensive agreement between these two fields appears to exist more at the administrative level than it does at the functional level.

6. The preparation program in Instructional Technology should provide many different opportunities for a general core of experiences that would be available to all advanced graduate students.

An optimum program offering including all of the specialty areas in the field can be offered only with extreme difficulty by the schools that have instructional departments dealing with Instructional Technology. The proposal of the University Consortium in Eduational Media and Technology referring to the exchange of students and/or instructional personnel should receive prompt consideration by the institutions comprising the membership of that organization.

Recognition of personalities and inter-personal relationships implies that no two students are going to obtain identical preparation experiences. To deprecate these differences would be short-sighted. They are the strengthening qualities of any developing program. Only as an overall program is based upon a broad, multi-faceted foundation can it be flexible enough to make its maximum contribution to a changing, growing society.

Abstract No. **22** Haviland-Millard

SOME MULTI-MEDIA CLASSROOMS REVISITED: WHAT'S WORKING AND WHAT ISN'T?

David S. Haviland, Director
Center for Architectural Research
Rensselaer Polytechnic Institute
Troy, New York

and William L. Millard
Coordinator of Instructional Media Services
Division of Research in Medical Education
School of Medicine
University of Southern California
Los Angeles, California

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A decade has passed since the first of the "modern generation" of classrooms specifically designed for educational technology were designed and built. A good deal of planning and design guidance has been developed, dozens–hundreds–of classrooms have been built, and thousands of students have sat through many thousands of hours of instruction in them. Some of the rooms have "worked"; others have not.

Several months ago, Educational Facilities Laboratories asked RPI's Center for Architectural Research, a group which developed much of the early planning guidance for these rooms, to revisit some of them–particularly in colleges and universities. The Center was charged to take a careful look, to see the rooms in use, and to speak with all "users"–from the president of the college to the department chairmen, teachers, technicians and the students. The objective: to see if the rooms appeared to be doing the job. If they were, why? If they were not, why not?

Evaluating a multi-media classroom is not an easy task. It is far more than an architectural entity; it is a closely-knit system of people and equipment, of philosophies and approaches, of time patterns and support concepts, all housed in a carefully-designed physical environment. As part of this modest evaluation effort, we visited some eight college campuses–from the sprawling university campus of Southern Illinois in Carbondale to junior colleges like Orange Coast College in Costa Mesa, California.

As a result of these visits, several points about multi-media classroom design and use became evident. (Each of these will be expanded, both in words and in the use of the many slides taken during the visits.)

The lecture hall as a teaching instrument. Evaluating a room begins with the philosophy behind it. The debate over large group instruction (even when effectively mediated) still rages in many quarters, and a person's reactions to a multi-media teaching space bears a marked resemblance to his reactions to the large-group mediated instruction concept. Those who want to make it work do–and often do very well; a common reaction is that the room "doesn't do enough for them."

The lecture hall as part of a system. The whole philosophy of instruction which utilizes large-group mediated classrooms requires a systems approach: the teaching-learning act must be supported in many ways. This, of course, is nothing new; but support system breakdowns accounted for a great many of what seemed to be (on their face) complaints about the architecture of these rooms. The issues of administrative commitment, a professional approach on the part of the resources staff, well-organized technical back-up, and a careful approach which encourages innovation and change without damaging egos are critical ones. Architecture can do very little to cover up basic flaws here.

The instructor as user. Perhaps one of the most significant architectural issues is faced when we consider the instructor as a user of a multi-media room. Much of the design guidance developed at RPI and elsewhere concentrates on the student: can he see? can he hear? can he take notes? is he too warm? is he comfortable in his chair? can he learn?

Too few of the rooms visited adequately responded to another set of questions: can the teacher teach? can he manipulate the room when he must? do the "mechanics" of operating the room or the equipment get in the way? does the instructor have to climb over two rows of seats to get to the overhead projector? does he have to shout directions to a projectionist in the back of the room? does he have no choice but to stand there and "melt" if something goes wrong? can he set up and rehearse complex presentations ahead of time?

In many colleges only the bolder instructors tackle the multi-media classrooms. Others are afraid; and too often, for good reason. There are many things which the architecture can do to encourage and nurture this

fear. We must recognize that it will be terribly difficult for learners to learn in these rooms if the teachers cannot teach.

The instructor as learner: the case of the overhead projector. Two paradoxical patterns emerge in visiting multi-media classrooms and speaking with those who use them:

1. Most teachers are "initiated" into the media fraternity via the overhead projector.
2. Most classrooms are not designed to effectively accommodate this piece of equipment.

Problems of image, size, height, projector location and fixity are closely related to the design of the room. One can argue that if the room will not allow the instructor himself to learn (to use the media), then there are going to be "acceptance problems."

The technician: the forgotten user? Because support is expensive, it must be efficient, and poor planning and design can make technical back-up wonderfully inefficient. We visited places where technicians moved around on their stomachs on skateboards (to stay out of the path of projection beams) and where a fellow had to run over 100' where a simple, well-placed door would have cut the distance to 5'. Trivial problems? Hardly.

Miscellany. Finally a whole series of architectural/educational/technical problems in the design of lecture halls is becoming evident through use. The "auditorium syndrome," the physical-psychological relationship between student and teacher, the design of display walls, problems with unwanted light, the janitor as "change agent," and the general character of these rooms all seem to rate heavily in user evaluations.

* * * *

On the basis of the visits made and the interviews conducted, it can be concluded that the broad planning and design guidance developed and disseminated over the last ten years is basically sound. Many good rooms have emerged where screens, projectors, and receivers are appropriately selected and sized; and where students can see and hear. Many of these rooms, however, have flaws; indeed, some of them are the "tragic" variety. Perhaps the old adage, "for want of a nail . . . the kingdom was lost" does operate here.

The purpose of the visits was to pinpoint some of the "nails" and to bring them to the attention of educators who have or will have multi-media rooms soon. These observations, and more of the same variety, will shortly appear in an EFL publication developed from these visits and interviews.

Abstract No. 23 Knirk

REPORT OF A STUDY OF ELEMENTARY AND SECONDARY INSTRUCTIONAL TELEVISION PROGRAMS IN NEW YORK STATE

Frederick G. Knirk
Associate Director Academic Affairs
Department of Instructional Technology
Syracuse University, 123 College Place
Syracuse, New York 13210

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The Bureau of Programs Evaluation, New York State Department of Education, sponsored a study to determine the effects of instructional television in the elementary and secondary schools in the State of New York between 1966 and 1968.

In order to obtain valid data, 65 schools (N = 105) using instructional television and 9 school systems not using instructional television were identified and visited by 15 interviewers using discussion guides. All of the educational broadcast stations (N = 9) were visited and this data compared with the using school data. "Innovative" schools were identified and this data was compared with the using sample.

The individuals visited were school administrators, managers of the television facilities, classroom teachers, and students. The data from these sources were compared with each other.

This study includes information on the general successes and problems of television in the schools. The primary problems of using instructional television revolved around program development and scheduling. There are too few channels for the number of potential viewers who have a diverse range of requirements (content, ability or grade, local schedule, etc.). Teacher attitudes, equipment reliability, availability of trained technicians, economic support and other variables were not identified as significantly problems by any sampled population.

The programs broadcast by the educational council stations were usually used as enrichment or resource supplements for elementary aged children. Locally produced programs were often used for micro-teaching or "image" reflecting, correcting and building activities. In addition, a number of schools produced news programs. Many comments from schools which produced instructional programs reflected a concern for the expense of television. Several educators felt the per pupil costs of instruction could be reduced if the teacher/pupil ratio were modified and/or if some relatively expensive programs (as music or foreign language) were taught by this manner with teachers aids providing supervisory activities.

Newer buildings, in general, facilitate the use of I.T.V. while the older buildings (over 15 years) often had insufficient power sources (location and amperage), no conduit for ease of distributing the programs, poor light control and inadequate acoustical control. The architects seem to be providing buildings which permit the easy use of I.T.V. now.

Data involving teacher training in the use of I.T.V., the numbers and uses of videotape recorders and other equipment, the use of studios, the reliability of equipment, student and teacher attitudes on I.T.V. as an efficient use of funds, hours of available broadcast programming, etc., will be identified.

This study is of educational importance because of the resources expended on instructional television throughout the United States. The findings from this broad sample of schools can provide direction for educators contemplating or using television for instructional purposes.

Abstract No. 24 Reck

HOPE FOR THE MEDIA CENTER: A PROPOSED MEDIA TRAINING PROGRAM

Lawrence R. Reck
Assistant Professor, Audiovisual Education
Indiana State University
Terre Haute, Indiana 47806

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Ever since an integrated set of standards for school media centers was issued jointly by AASL-DAVI last year, schools have become increasingly concerned not only with the quality and size of collections but with the qualifications of the media center directors needed to administer them. To ascertain whether present media center directors were considered qualified for their positions, this writer sent questionnaires to every state department audiovisual director and school library director in the United States. When asked what percentage of school librarians or audiovisual coordinators within their states were adequately prepared to establish and administer a media center program, 51 percent of these state media leaders responded that only from 0 to 19 percent of the audiovisual coordinators and librarians were adequately prepared, while 29 percent stated only from 20 to 39 percent of such personnel were adequately prepared.

The standards advocate a combined program of service but do not dictate how the preparation of media center directors should be accomplished. The subject for this writer's research study was the design of a program to better prepare persons to administer media centers. Although the program was directed to the state of New Mexico, with slight modifications it could serve as a model for establishing combined media programs throughout the United States. The process of determining needs and of establishing the program are also adaptable.

The first procedure for establishing the program was to determine present and future needs of educators in New Mexico. Questionnaires were sent to every public school audiovisual coordinator, librarian, and principal in the state, and to a sampling of teachers. To obtain ideas, suggestions, and information from specialists in the media field all state departments in the nation were surveyed as were major college and university audiovisual center directors and library directors throughout the country. In addition, information was gathered from students in library and audiovisual classes at the University of New Mexico. From almost 2,000 questionnaires distributed, over 1,100 were completed and returned. All responses were analyzed, state certification requirements were scrutinized, state curriculum was considered, and University of New Mexico requirements were included. The program was, therefore, based on a firm foundation including national media trends and state needs as related by educators in New Mexico.

Two programs have been proposed: (1) Master of Educational Media, and (2) Specialist of Educational Media. Students entering the Master of Educational Media program must satisfy requirements for admission to the Graduate School of the University of New Mexico and any undergraduate prerequisites established by the Department of Educational Media. It is recommended that students have had a minimum of one year's experience as a teacher, audiovisual coordinator, or librarian. Students who have not been certified for at least one year must take a practicum course during the first semester of program participation.

For those students who enter the program with little or no library, audiovisual, or teaching background, their Committee on Studies will decide which prerequisite courses must be completed for a minimal level of preparation. Prerequisites would be in Library Science, Educational Foundations, Psychology, and Educational Media. The student can substitute one prerequisite course for one elective course not to exceed three credits. Required courses for the master's program are as follows: Philosophy of Educational Media; Fundamentals of Educational Media; Selection and Organization of Educational Media; Curriculum and Educational Media Integration; Administration of Media Centers; Automation in Media Centers; Learning and Media; Research Methods in Education; and Reading Guidance for Elementary (Secondary) Schools. Participants would conclude the program with a total of thirty-six credits.

Program participants would work cooperatively with elementary and secondary education programs. They would be available at the College of Education Learning Materials Center to counsel undergraduate education practicum students pertaining to media. Participants could also design media kits in which content areas would be developed for a unit, thus emphasizing the systems approach.

Persons seeking admission directly into the Specialist of Educational Media degree program must have a master's degree and a minimum of one year's full-time professional experience in a library, audiovisual center, or teaching position. Those entering the program with a master's degree in other areas of education will have their

courses and background evaluated to discover any missing prerequisites.

The requirement for the specialist degree is thirty credits, including twenty required hours and ten elective hours. A wide variety of electives are available to the participants. Required courses for persons in the Specialist of Educational Media program are as follows: Public School Finance; Principles of Curriculum Development; Contemporary Educational Media Issues and Trends; School Law; Curriculum Trends and Issues; Advanced Statistics in Education; Research in Educational Media; and Advanced Administrative Techniques.

Although specifically designed to prepare personnel to work in the media field, both programs are also suitable for teachers and administrators whose primary duties are not limited to media but who wish to further their understanding in the field.

The proposed media training program meets the needs of educators of New Mexico and other multicultural Southwestern states in the following specific ways:

1. The media degree program is unique. There is no other in the Southwest relating a media program specifically to that area of the country.

2. Questionnaires were designed for the Southwest and sent to New Mexico educators. The program is to a substantial degree the outcome of responses to these questionnaires.

3. All state departments of education were contacted to determine their needs. Much information was gathered from the Southwestern states through these questionnaires. The results of these questionnaires were integrated into the program.

4. The program is designed so participants can work more effectively with bilingual students.

The media training programs were designed to take into account the duties and obligations of media center directors. The Master of Educational Media program was planned for individual school media center personnel, while the Specialist of Educational Media program was designed for district and state media training. The programs emphasize media administration, research, media fundamentals, learning processes, and curriculum.

Abstract No. 25 Gilman-Hernandez

THE RETENTION OF CONCEPTS LEARNED AS A RESULT OF SEVERAL FEEDBACK MODES IN COMPUTER-ASSISTED INSTRUCTION

David Alan Gilman
Ivan Hernandez
Indiana State University
Terre Haute, Indiana 47809

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Promising techniques for investigating the changes in learning occurring during instruction are the admissible probability procedures reported by Emir Shuford (1966). Shuford's technique requires that the student accompany each of his responses with a degree of certainty estimate. An admissible probability measurement procedure is a testing technique which (1) has the property that it guarantees that any student, at any level of knowledge or skill, can maximize his expected score *if and only if* he honestly reflects his degree of belief probability and (2) the procedure makes this property known to the student.

Several feedback modes are used in programmed learning. The relative efficiency of these feedback modes for correcting student errors was investigated by noting the effect of various feedback modes on the learner's degree of certainty estimates.

Purpose

The purpose of the study was to determine if feedback mode has an effect on retention of learning as a result of several feedback modes in computer-assisted instruction as measured by retention test scores indicating

a. the number of correct responses
b. degree of certainty estimates for correct response
c. admissible probability scores

Procedure Used

Seventy-five university upperclassmen were taught 30 general science concepts by means of a computer-assisted adjunct auto-instruction program. The frames of the program were multiple-choice items dealing with general science concepts. One response to each item was a correct response, one response to each item was a common misunderstanding of the concept, and the other two responses were reasonable and plausible distractors.

Equipment used was a Didactor, Solid State computer, DTR 300, equipped with touch-tone terminals, 35mm film, timed interface and sequence presentation. The treatment groups differed only with regard to feedback modes. The five modes of feedback compared were (Group A) no feedback, (Group B), feedback of "correct" or "wrong," (Group C) feedback of the correct response choice, (Group D) feedback appropriate to the student's response, (Group E) a combination of the feedback modes of Groups B, C, and D.

Ss were assigned to five strata on the basis of scholastic aptitude. The fifteen *Ss* in each strata were randomly assigned to one of the five treatment groups. A retention test was administered four months subsequent to instruction. *Ss*' responses on the retention test were accompanied by degree of certainty estimates. A treatment x level analysis of variance was performed to determine whether differences existed between any of the treatment groups with respect to raw score, degree of certainty estimate and admissible probability scores. Tukey's W-Procedure was used to ascertain if differences existed specific pairs of means for each of the dependent variables.

Results

Post-test results indicate better immediate retention, in terms of degree of certainty estimates, and admissible probability scores for those *Ss* receiving a combination of feedback modes (Group E) and give indications of improved retention on the part of the students receiving response contingent feedback (Groups D and E).

Implications

An obvious advantage of CAI over other forms of programmed instruction is that CAI has the capability to provide feedback contingent on the *Ss*' responses.

Results of this study indicate that *Ss* learn more and are more confident of their responses, when *Ss* are provided feedback contingent on their responses.

Reference

Shuford, E. A., Jr. Admissible probability measurement procedures. *Psychometrika*, 1966, 31, 125-145.

Abstract No. 26 Hall

INSERVICE MATHEMATICS EDUCATION FOR ELEMENTARY SCHOOL TEACHERS VIA COMPUTER-ASSISTED INSTRUCTION

Keith A. Hall
Associate Professor of Education
Director of Computer-Assisted Instruction Laboratory
The Pennsylvania State University
University Park, Pennsylvania

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An objective look reveals that the mathematics teaching skills of Appalachian elementary school teachers are, in too many instances, inadequate. There are two important reasons for this condition. The first reason is lack of effective preservice preparation, and the second reason is lack of adequate inservice education. Computer-assisted instruction offers the potential for meeting inservice training needs of the student teachers and the administration.

Objectives

The goal of this project was to field test a program of inservice education in modern mathematics and mathematics teaching methods for elementary school teachers in the Appalachian region. An IBM 1500 instructional computer system was installed in Dryden, Virginia, then in Gladeville, Virginia, and finally, in California, Pennsylvania, to administer the computer-based course to teachers. The system was used during late afternoon and evening hours in order to provide individualized instruction for elementary school teachers who drove in from a radius of approximately twenty miles.

Computer Configuration

The computer system used for this program was an IBM 1500 instructional system with 16 student stations. Each student station consisted of a cathode ray tube with a typewriter keyboard and light pen as the main interface between the instructional program and the student. In addition to this device, a random access image projector under computer control was provided at each station. The image projector utilizes a 16mm self-loading reel containing up to 1,000 randomly accessible color photographic images.

Instructional Program

The computer-assisted instruction course in mathematics and methods of teaching mathematics for elementary teachers was developed by Professors C. Alan Riedesel, Marilyn N. Suydam, and Cecil R. Trueblood of The Pennsylvania State University. The course adheres to the CUPM Level 1 recommendation with about 80 percent of the course devoted to mathematical content, and 20 percent devoted to the methods of teaching mathematics.

The course uses an integrated approach relying not only on tutorial activity at the computer terminal, but on the integration of printed instructional materials and manipulative devices to be used at the terminal and in the teacher's classroom. Each participant in the project received a copy of a textbook on methods of teaching elementary school mathematics, a handbook containing suggested lesson plans and problem assignments, and an assortment of manipulative devices such as Cuisenaire rods and counting sticks.

Participants

Of the 444 students who registered for the course, 387 completed the course. Two hundred forty-three students enrolled and received college credit from ten different institutions of higher learning.

Evaluation

A pre-test and post-test of mathematics content, a pre- and post-test of the participant's attitude toward mathematics, and a post-test of attitude toward CAI were administered to participants of the project. The mean performance of the students on the achievement test advanced from 53 percent correct on the pre-test to 73 percent correct on the post-test.

Perhaps the strongest demonstration of attitude toward the curriculum and the individualized instruction provided by computer-assisted instruction was the increased willingness and demand from the students to continue the daily schedule later and later into the evening hours as they became more involved with the course of study. Initially the daily schedule ended at 8:00 p.m. After each participant had studied for one or two hours at the student station, the interest of the students caused us to extend the daily schedule to 11:30 p.m.

Summary

It has been demonstrated by this project that the concept of mobile computer-assisted instruction is an effective means of providing inservice education in Appalachia. Mobile computer-assisted instruction has demonstrated the potential for providing high quality, individualized, inservice education to large numbers of students in sparsely settled areas.

Abstract No. 27 Breen

EFFECT OF VIDEOTAPE PLAYBACK AND TEACHER COMMENT ON ANXIETY DURING SUBSEQUENT TASK PERFORMANCE

Myles P. Breen
Instructional Media
College of Education
Northern Illinois University

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There has been considerable questioning of late of the correct usage of videotape playback in teaching skills. No longer is it taken for granted that videotape playback of itself will improve performance. Thomas Stroh (1968) in a book sponsored by the American Management Association has listed many of the pitfalls of incorrect usage of television recording in a training situation and suggests that the trainee can be detrimentally affected by negative feedback. Alkire (1969) surveyed the uses of videotape playback in the fields of education and mental health. Both studies, which were descriptive and eclectic, point out there is a paucity of experimental evidence available to allow one to assess the correct usage of videotape playback as an instrument of behavioral change. Both discussed the effects of visual self-confrontation on the student but posed more questions than they answered. The present study was designed to provide experimental evidence in this area.

Anxiety. Stroh suggested that one of the chief detrimental factors in the effects of videotape playback was the anxiety which might be evoked by the initial self-confrontation. The work of Mahl (1959) has provided a reliable indicant of anxiety in the nonfluencies of the respondents' speech. Following Mahl, nonfluencies were operationally defined as eight categories: Ah, sentence correction, sentence incompletion, repetition, stutter, intruding incoherent sound, tongue slip, and omission. Mahl reported an interobserver reliability of .94 for his instrument. Exact agreement of 3 independent scorers in the present experiment was 80.5.

Procedure. The six treatment groups were taken from the beginning Speech classes at NIU. Factors which affect composition were held constant. Total sample size was 110. n varied from 14 to 23.

The first speech for each member of each treatment group was treated in the following manner:

Group 1	VTR	Comment	Playback
Group 2	VTR	Self Analysis	Playback
Group 3	VTR	No Comment	Playback
Group 4	VTR	No Comment	No Playback
Group 5	VTR	Comment	No Playback
Group 6	No VTR	No Comment	No Playback

The "self analysis" (Group 2) treatment meant that the student was required to comment formally on his performance in the classroom. Following the treatment speech a second speech for each of the experimental groups was recorded on audio tape. Coding of nonfluencies was then carried out for each of the six treatments.

A paired comparisons design resulted in fifteen calculated t values as summarized in Table 1. Mean differences and t values are in Table 2.

Table 1: Frequency of Nonfluencies in Subsequent Performance

Treatment	VTR/No VTR	Teacher Comment	Playback/No Playback	Mean of Nonfluencies	5% Significant Difference
A	VTR	Comment	Playback	10.4	D, E, F
B	VTR	Self-Analysis	Playback	13.2	E, F
C	No VTR	Comment	No Playback	14.4	F
D	VTR	No Comment	No Playback	19.6	F
E	VTR	No Comment	Playback	21.3	F
F	No VTR	No Comment	No Playback	37.1	

Table 2: Mean Differences and t Values for Treatment Groups

Groups	DF	Mean Difference	Standard Error	t Value	
A – D	29	9.28	4.80	1.93	*
A – E	36	10.93	3.98	2.74	**
A – F	34	26.80	5.11	5.24	***
B – E	35	8.09	4.45	1.81	*
B – F	33	23.97	5.48	4.36	***
C – F	40	22.76	5.49	4.14	***
D – F	31	17.51	6.49	2.69	**
E – F	38	15.87	5.91	2.68	**

* p .05
** p .01
*** p .005

Results and Conclusions. From Table 1: 1. When VTR playback of practice performance was accompanied by teacher comment, students exhibited less anxiety in the subsequent performance of the task, than when VTR playback without teacher comment, or when no comment nor playback was available. 2. When VTR playback of the first speech was accompanied by a verbalized self analysis, the results were similar to the above. 3. When practice performance was accompanied by teacher comment without VTR, the students exhibited fewer nonfluencies in their subsequent speeches than the No VTR–No Comment group. 4. The VTR without teacher comment group exhibited fewer nonfluencies than the No VTR–No Comment group.

Implications. 1. Feedback from practice performance is important to the student in reduction of anxiety in subsequent tasks. 2. The results indicate the primacy of teacher comment in the feedback loop. 3. The VTR playback alone does not seem to be a good substitute for teacher comment. 4. The mere presence of the television camera–or the knowledge that they are being observed and recorded–tends to reduce student anxiety in subsequent performance.

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Abstract No. 28 Lafollette

THE EFFECT OF VIDEO FEEDBACK AND DEMONSTRATION FILM LOOPS ON LEARNING BASIC ARCHERY SKILL

James Joseph Lafollette, Assistant Professor
Audio Visual Media Center, Faculty of Education
The University of Alberta
Edmonton, Alberta, Canada

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Educators are being urged to make decisions based on a methodology of matching educational objectives with media of presentation. Designers of instruction for the teaching of gross motor skills have been forced to rely on findings from research conducted with fine motor tasks. It is questionable whether such findings may be safely applied to the learning of gross motor skills in physical education classes. Promising innovations for teaching gross motor skills include demonstration film loops in repetitive cartridges projected on a daylight screen, and television replay to provide "immediate" feedback with instructor and student analysis.

The purpose of this investigation was to provide experimental evidence concerning guidelines for selection of media for teaching gross motor skills. Specifically, the experiment attempted to answer these questions: Does video feedback have an effect on learning basic archery skill? Do demonstration film loops have an effect on learning basic archery skill? Is there an interaction between video feedback and demonstration film loops?

A two by two factorial arrangement of treatments was used. Four classes, each consisting of male students enrolled in beginning archery at Indiana University, were randomly assigned to each of four treatments:

TREATMENT	I-*Video feedback* Demonstration film loops
TREATMENT	II-*Video feedback* No demonstration film loops (instructor demonstration)
TREATMENT	III-*No video feedback* Demonstration film loops
TREATMENT	IV-*No video feedback* No demonstration film loops (instructor demonstration)

A total of 64 subjects participated in the study. For all treatment groups, the instructor served as supervisor and manager of all learning activities. When media were not involved, the instructor was responsible for all demonstration, explanation, and individual assistance. When video feedback was a variable, the performance of each subject was recorded on a videotape recorder and the instructor made a critical evaluation to the subject and the subject made a self-evaluation. When demonstration film loops were a variable, all demonstration of the skill was presented by specially produced sound film loops. During practice the film loops were available for subjects who wished to study them again.

Archery achievement was determined by subjects' scores on the modified Chicago and modified Flint Rounds of target shooting. A pre-test, which was similar to the modified Chicago Round, except for shooting from a shorter distance, provided the covariate measures required for analysis of covariance. The experimental results showed that none of the four treatment combinations was significantly superior to another. Neither of the main effects, video feedback or demonstration film loops, resulted in significantly superior archery achievement. Interaction was not significant.

Additional conclusions based on an attitude survey and subjective observation included (1) A significant proportion of the subjects had favorable attitudes toward their experience with the media during the study. (2) Since a significant improvement was shown by all four treatment groups, it would be feasible to use any media combination employed in this study for beginning skill instruction with a qualified instructor as "manager of learning activities" with equivalent success. (3) A particular value derived from use of a videotape recorder to provide feedback during skill instruction is that all students receive some attention from the instructor. (4) Demonstration film loops for teaching beginning motor skills provide a uniform, controlled presentation which is equivalent to a qualified instructor's demonstration. This suggests further investigation with film loops in place of a live presentation, when skilled instructor demonstrations are not available, possibly with favorable cost/effect benefits resulting.

Abstract No. 29 Godfrey-Wayne

EDUCATIONAL RESEARCH AND THE SCHOOL ADMINISTRATOR

Eleanor P. Godfrey and Ivor Wayne
Bureau of Social Science Research, Inc.
1200 Seventeenth Street, N.W.
Washington, D.C. 20036

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Objectives of the Inquiry

In the winter of 1968-69, the Bureau of Social Science Research undertook a study of the relevance of educational R & D to local district practice as part of a larger project conducted by Syracuse University Research Corporation.

Research Methods

A random sample of 573 public school districts, stratified by size and geographic region was surveyed by mail; 60 percent of the districts returned usable questionnaires. Results are presented for each size category and appropriate weights applied to infer national response patterns.

Results

The majority of the school superintendents had some doubts about the significance of the influence of R & D activities on American education. Furthermore, two-thirds of the superintendents did not identify any R & D result or product that has had, or will have, widespread influence on school practices.

The majority also agreed that the researcher is more interested in refinement of his research than in implementation of his results and that dissemination is the most overlooked aspect of R & D activities. Research publications from AERA, ERIC, or the NEA do not fill the information gap; only a small fraction of the districts use any of these sources extensively. Rather, school personnel rely on professional meetings for a working knowledge of research developments. Administrators call for more readable reports, stressing application, more workshops, and more demonstration projects.

Educational Importance of Study

The hiatus between the frames of reference of the local administrator and the researcher is a timely topic. Commissioner Allen intends to establish a "special dissemination unit" within the U.S. Office of Education. The success of the unit will require that the educational community develop a structure that will insure effective feedback. R & D must become R & 3D (Research, Development, Dissemination, and Demonstration) in a manner analogous to the industrial process from basic research to final sale.

Abstract No. **30** Alexander-Holland

RELATING AGENCY OBJECTIVES TO BUDGET ORGANIZATION: FACTOR BUDGETING FOR AN EDUCATIONAL FILM LIBRARY

William E. Alexander and John W. Holland
Ontario Institute for Studies in Education
Toronto 5, Ontario

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The purpose of this paper and the research upon which it is based is to offer an approach to the systematic presentation of an educational service agency's expenditure decisions in a format and in terms that will constitute a frame of reference for relating those decisions to organizational research and quantitative information about the system. A secondary purpose is to promote the construction of budgets for specialized agencies that can be integrated into program budgets (or ends-oriented budgets) for the larger systems of which specialized agencies are complex sub-systems.

On the basis of the published results of research, an analysis of what film-library managers do, and a survey of the conflicts confronted in film library management as articulated by those managers, seven factors contributing to variations in the number of film requests from teachers have been isolated and described along with some associated variables:

1. Availability of equipment
2. Number, by level and seasonality, of titles
3. Teacher-lead-time
   a. contact-time
   b. process-time
   c. delivery-time
4. Ease of Ordering
   a. Ease of locating information
   b. Ease of submitting an order
5. The hold-time
6. Information
7. Training

Two claims can be made for these factors. First, they represent some powerful determinants of teacher demand for films. Second, the factors listed are under the control of the people with immediate responsibility for film distribution. Consequently, the variables associated with these factors are important local-level control variables. More importantly, perhaps, these variables may be conceptualized as representing competing claims for the same limited resources. Expenditure decisions resolving these competing claims can, therefore, be related to quantitative information on systems outputs and serve as the elements of a rationalized agency budget.

Abstract No. 32 Dunathan-Rottmann

A SURVEY OF THE ACCEPTABILITY TO SELECTED GRADUATE SCHOOLS OF THESES AND DISSERTATIONS REPORTED IN NONPRINT MEDIA

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Arni T. Dunathan
Instructional Media Laboratory
College of Education
University of Missouri

and Betty Cook Rottmann
Office of Public Information
University of Missouri
Columbia, Missouri

Purposes

1. To determine the acceptability of nonprint media for reporting graduate research. 2. To rank specific media by acceptability. 3. To estimate the need for a style manual for the preparation of nonprint reports of research.

Procedures

An eight item questionnaire was sent to Graduate Deans of forty-six Midwestern universities. The acceptability (had–had not, would–would not) of seven media was requested. Space was provided for writing-in other media and comments.

Results

Thirty-nine questionnaires (85 percent) were returned. Many respondents displayed strong emotional reactions to the question. Fifty-six percent responded positively. Specifically, thirty-six percent had accepted graduate research reported in nonprint media; eight percent would accept; fifteen percent would consider. The remainder neither would accept nor consider such reports. Sound motion pictures had been most frequently accepted. Television recordings were most frequently cited as not yet accepted but acceptable. Proper documentation of evidence was the most frequently cited condition for acceptance of nonprint reports.

Implications

Graduate Deans are sensitive to and interested in the question. Overall acceptability of nonprint reporting is greater than suspected. Proper documentation is a prime concern; a style manual for the preparation of nonprint reports of research is needed.

Abstract No. 33 Diamond

A MODULAR APPROACH TO MUSIC APPRECIATION WITH EMPHASIS ON INDEPENDENT STUDY (PILOT PROJECT)

Dr. Robert M. Diamond
Director, Instructional Resources Center
State University College
Fredonia, New York 14063

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Traditionally, the college level music appreciation course for the non-music major is taught by the lecture method to large sections of students. This was a pilot project conducted over a two week period dealing with the opera unit of the course. A systems approach was used to design the overall instructional sequence and develop the required materials. Behavioral objectives were developed for each of the seven elements of the sequence with tests constructed to measure the success of the students in reaching these pre-determined goals. The sequence itself consisted of the following elements (see attachment):

1. A programed booklet on vocabulary required of students scoring below 65% on vocabulary pre-test.
2. Five mediated independent learning sequences with topics based on a student interest questionnaire administered at the beginning of the semester. These locally produced units were as follows:
   a. Staging an Opera (tape-slide)
   b. Make-up (tape-slide)
   c. Set Design (tape-slide)
   d. Costuming (tape-slide)
   e. Voice in Opera (tape)

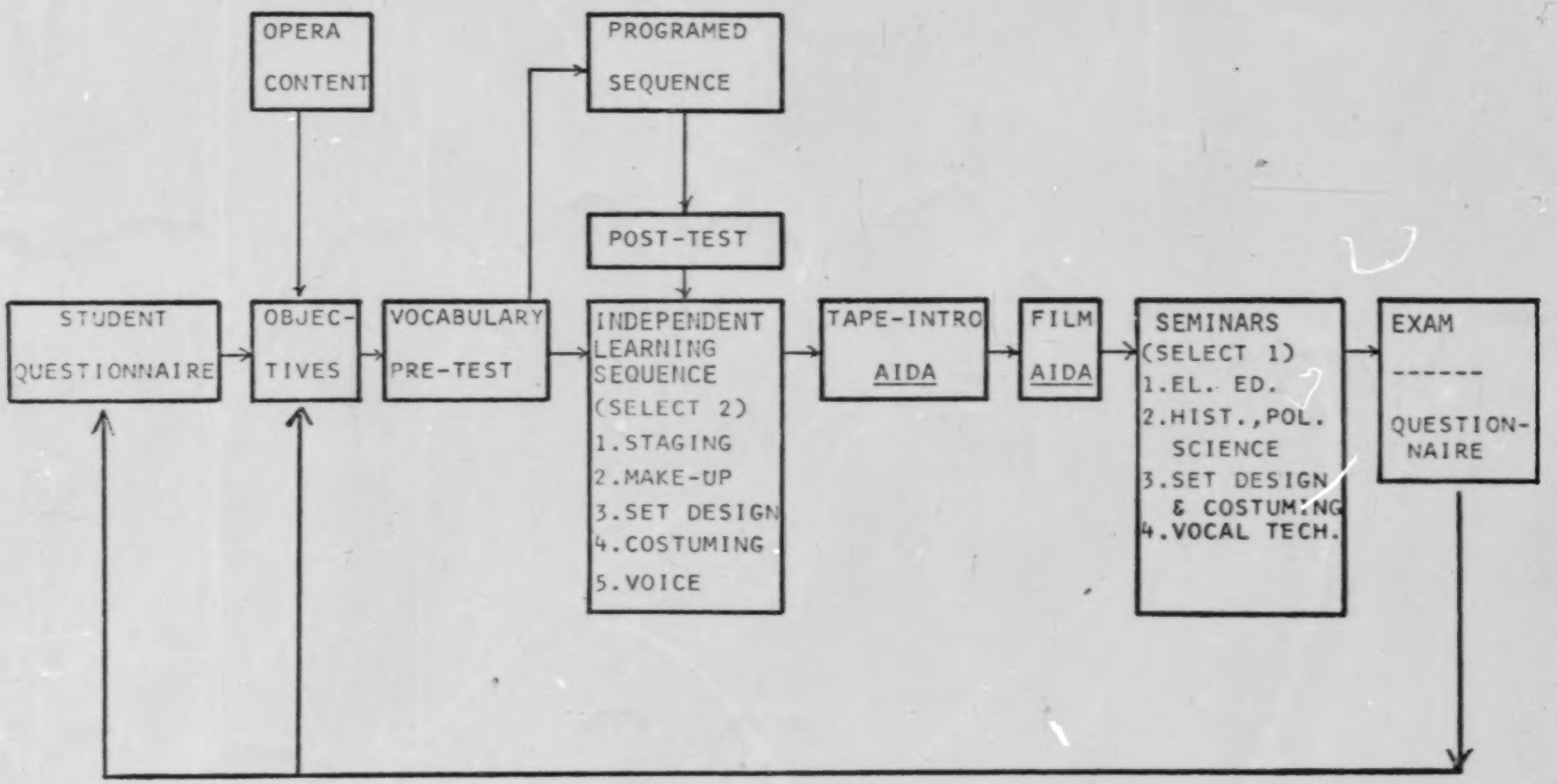
   Students were required to complete two of the above prior to viewing the complete opera.
3. Preparation for "Aida" (Dial access audio system with libretto).
4. Film "Aida" (two showings).
5. Seminars (students to select one with topics based on areas of interest).

Two seminar sections were on the use of opera within the classroom for Elementary Education Majors and one section each on Set Design and Costuming, Vocal Techniques and the relationship of opera to History and Political Science.

Results: The unit proved to be instructionally effective, well liked by students and highly efficient in the use of both faculty and student time. In all seven instructional units, the mode was at the 100% level. The mean on the 30 item vocabulary test for students required to complete the programed sequence raised from 13.1 to 28.3. There was also a major change in a positive direction in the students' attitude to opera. All but one of the 167 students completing the questionnaire stated they would like more units of this type in the course. Over 40% of the students completed more of the optional units than were required.

As a result of this project, the entire course is now being revised along the lines of this pilot project.

PILOT SEQUENCE (OPERA UNIT)



Instructional Resources Center
State University College
Fredonia, New York 14063

Abstract No. 34 McHenry, Griggs, Grady, Peterson, and Rozeboom

QUALITATIVE EFFECTS OF INCREASING SUBJECT MATTER CONTENT AND MEDIATING CERTAIN LECTURE PORTIONS OF AN HONORS COURSE IN COLLEGE PHYSICS

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Dale E. McHenry
James L. Griggs, Jr.
Michael J. Grady, Jr.
Edward A. Peterson
Victor E. Rozeboom

United States Air Force Academy

Educational programs for gifted students have traditionally involved combinations of acceleration, enrichment, and smaller classes. Seldom, however, does the literature on this subject mention the use of audiovisual aids in particular relation to programs for the gifted.

Given the widely-accepted opinion that audiovisual aids enhance learning efficiency, it seems logical to suppose that these aids should also prove useful in developing accelerated programs for the gifted students, and thereby enable enrichment within the time limits of a particular course.

For the past few years, an honors course in General Physics has been offered to freshman cadets at the United States Air Force Academy who are identified as possessing superior aptitude for the study of physics. The standard version of the course is offered to sophomores as part of the required core curriculum. Multiple regression techniques are employed to identify those cadets with exceptional potential, using such predictor variables as prior academic average, SAT scores, etc.

During the fall of 1969, a joint planning effort involving instructors from the Department of Physics and personnel from the Directorate of Educational Research was undertaken to design a course which would include twenty mediated lectures out of a course totaling some 100 hours of lecture and laboratory experiences. These lectures were to be presented to large groups (45 men), and would serve to introduce new topics. Each such mediated lecture typically would be followed by one or more laboratory and discussion periods. Laboratory sessions, however, were devoted to enrichment, rather than for demonstration or reinforcement of concepts already covered. In fact, the analog computer was used as an audiovisual aid in all laboratory sessions to extend the concepts covered in lectures by illustrating complex physical phenomena while relieving students of the necessity of engaging in laborious mathematical manipulations. Demonstrations using classical apparatus were performed in lecture sessions via audiovisual aids and devices.

Nearly all of the audiovisual aids and devices used were manufactured locally, and were the result of a team effort among the physics instructors, educational psychologists, graphic artists, and media resource personnel. Approximately 270 35mm slides, 45 overhead transparencies (many of which employed technated visualizations), twelve films, and twenty film clips were used in the twenty mediated lectures, plus about a dozen three-dimensional models. Two weeks prior to each lecture, the educational planning team met for about two hours to design audiovisual aids, and to identify requirements for existing media. The results of these conferences were brought to fruition by graphic artists and media resource people of the Directorate of Instructional Technology. All audiovisual aids thus created were assembled by the physics instructors several days prior to each mediated lecture for the purpose of "dry-running" each lesson at least once before the actual presentation.

In order to assess the relative academic achievement which could be attributed to the use of media, final examination scores for the experimental group were compared to similar scores obtained by the honors physics students in a non-mediated course the previous year, on forty test items which were common to both groups. Analysis of covariance was employed to equate the groups statistically with respect to those ability/achievement variables which correlated significantly with success in physics.

It was noted that the students in the mediated honors course achieved slightly, but significantly less than had the students in the non-mediated course the previous year. However, this slight difference takes on a new significance when viewed in the light of the considerable difference in subject-matter content between the two courses.

The mediated course had been augmented by ten hours of new material within the same time con-

straints. This course therefore had correspondingly fewer lecture hours devoted to the content common to both courses. Also, the laboratory experiences in the mediated course differed markedly, in that they were devoted entirely to enrichment rather than to review, demonstration and reinforcement. The mediated course contained ten fewer lecture and discussion hours devoted to the traditional topics upon which the forty common final examination items had been written. In addition, the mediated course contained nine fewer hours devoted to evaluation of cadet achievement. These hours were used for teaching new topics including relativity, satellites, and nuclear physics, which had been added to the course. As a result, the number of class and laboratory hours devoted to the topics represented on the 40-common-item criterion test comprised only sixty percent of the total course time in the mediated honors course. In contrast, ninety-seven percent of the non-mediated course was devoted to these topics.

It should be noted that this study made no attempt to assess any group differences in attitude toward either the subject matter or the method of presentation. However, the honors course was taught in the fall of 1969 in almost exactly the same way as it had been taught during the spring semester. Students in the fall course were asked to react to the course content and to various aspects of the teaching methodology employed. Responses to this questionnaire indicated a predominantly favorable reaction to the teaching methodology and to the new "modern physics" topics which the course included.

Specifically, ninety-three percent of the cadets indicated that the use of audiovisual aids had improved their understanding of the subject matter. Seventy percent felt that the mediated overview lectures had aroused their interest in the subject matter. Eighty-four percent indicated that they had enjoyed the course, and seventy-two percent felt that they would rather have been enrolled in the honors program (as they were) instead of the regular course. Regarding the use of the analog computer as an audiovisual aid, eighty-seven percent of the students indicated they would rather *not* return to the usual type of physics experiments, and eighty percent felt that the analog computer had helped them to comprehend physical principles. Finally, the intent to use laboratories for enrichment purposes was apparently successful, as seventy percent of the students felt that the analog problems either extended textual material or had no relationship to it, whereas only thirty percent indicated that the analog problems reinforced the textual material.

Conclusions

The data suggested that the systematic use of audiovisual aids for overview lectures may assist materially in enabling educational enrichment for the academically gifted college science student.

Even when the class time devoted to certain topics was decreased by approximately one-third, only a small drop in achievement resulted for these traditional topics. In return, the course was made much more comprehensive in terms of twentieth-century developments in the discipline. And finally, a similarly-taught course the following semester met with overwhelmingly favorable student reactions.

Abstract No. 35 Utz

THE USE OF COMPUTER GENERATED TESTS TO SELECT A SPEAKER FOR A RANDOM ACCESS DIGITAL AUDIO SYSTEM

Walter J. Utz, Jr.
Educational Representative
RCA Computer Systems Division
530 University Avenue
Palo Alto, California 94301

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The spoken word is an integral part of a child's education, and computerized speech enhances the effectiveness of computer-assisted instruction as an educational tool. Conventional analog tape recording methods do not readily permit random access of numerous replies to cover a wide range of learning situations. Digital audio under computer control allows a very wide range of replies, but it poses special problems in the areas of listener attitude and speaker intelligibility. This paper discusses the design and implementation of special tests to discover a speaker who would be most pleasing and most intelligible to students using random access digital audio in a computer-assisted instruction system.

Although intelligible speech has been synthesized by various methods, the artificial speech quality has been judged to be a possible source of interference with the learning process. The present digital audio system operates at the word level, with sentences constructed from whole words which are stored on a computer disc unit. This is approximately the same as recording several thousand words on small lengths of recording tape, and then composing a message by splicing the proper pieces of tape. The computer performs the task at the rate of 40 words per minute, and this speed permits the simultaneous composition of messages for several listeners.

The computer generated messages must be intelligible, but they are being composed of words spoken out of context. The human speaker who is chosen for such a digital audio system must be able to pronounce the words in such a way as to minimize the contextual conflicts in pronounciation, while at the same time achieving a high note of intelligibility. In this case, intelligibility is the prime factor, with attitude playing a major supporting role.

The ability to achieve a high rate of intelligibility, while minimizing the contextual problem of pronunciation, might not be restricted to professional announcers. The auditions included both amateur and professional speakers with approximately an equal number of males and females. Each speaker read a list of monosyllables chosen at random from the Harvard monosyllable lists, and they also read sentences designed to cover the normal range of pronunciation problems.

A balanced incomplete factorial test design was used to compare the speakers. In this test, the speakers are presented in binary comparisons, and the listeners are then asked to indicate their preferences for speaker A, speaker B, or neither speaker. The test design requires 342 binary speaker comparisons for 19 auditioned speakers, and each listener group rated 57 binary comparisons.

Each comparison consists of one speaker saying three words, and then another speaker saying the same three words. To eliminate listener fatigue, there are ten words in a list and each comparison moves to the next three words on the list.

The production of this type of test by conventional type splicing or dubbing methods would be an involved task. The computer audio delivery program was modified to select the words for each pair of speaker comparisons, and the complete set of test tapes was produced in less than two hours. The computer not only selected the words, it also played the audio comparisons which were recorded on a standard tape recorder.

The seven speakers with the highest scores in the attitude tests read the intelligibility tests as specified by the Acoustical Society of America. These tests were administered to the same listener groups under the same playback configuration as the attitude tests.

The four highest scoring speakers in the intelligibility tests have some form of professional speech training, and one is a commercial radio announcer. Female voices tend to be lower in pitch, while the male voices tend to be higher among the highest scoring speakers. There is a consistency in the attitude and intelligibility scores which may indicate that intelligible voices are preferred voices.

The highest scoring voice was used to produce a working audio dictionary of approximately 600 words to be used for a digital audio system in a computer-assisted instruction installation. The computer generated audio output has an intelligibility level that is greater than 90% when played over earphones in our installation.

Abstract No. 36 Stefani

TRAINING TEACHERS TO PRODUCE SPOKE-PAKS FOR INDIVIDUALIZING INSTRUCTION

John A. Stefani, Director
Project SPOKE
37 West Main Street
Norton, Massachusetts 02766

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Project SPOKE is a regional educational resource, media production and in-service training center serving the public and non-public schools of Easton, Foxborough, Mansfield, North Attleboro, Norton, and Walpole. The center accommodates approximately 1300 teachers and upwards of 22,000 students.

The project has been created to provide the cooperating school districts with facilities, supportive services, and instructional resources based on common needs heretofore economically unfeasible. Furthermore, SPOKE is attempting to promote a more viable and relevant education for each individual youngster involved by providing teachers with access to and knowledge about more sophisticated instructional materials and procedures. In this way, the gap between theoretical research and classroom practice can be bridged more readily.

A major thrust of the project is the development and improvement of instructional techniques through the utilization of a systems approach to curriculum design. This is achieved through a variety of continuing in-service training programs for educational personnel. One of these programs has been designed and developed to train teachers to differentiate and individualize instruction for students in grades K-12 through the preparation of SPOKE-PAKS. The latter, also referred to as differentiated learning packets, are defined as self-contained, multi-media, student oriented units designed to teach a single concept or skill.

Steps in Preparing a SPOKE-PAK

During the training program, teachers are advised to select a particular concept or skill that can be acquired by students in a one to three week period of time. Once selected, these concepts or skills are then translated into precise and measurable terminal and intermediate performance objectives. These objectives are then taxonomically categorized to ensure that a hierarchy of skills are included to meet the needs of individual students.

The terminal performance objective explicitly defines what it is the student will be able to do upon completion of the learning sequence. It is the broadest yet most comprehensive summary statement of the learning outcomes included in the packet. Through a process of analysis, intermediate performance objectives are then identified. These are the specific interim steps which will lead the students to the achievement of the terminal performance objective.

Once all of the performance objectives have been specified, it is the responsibility of the packet developer to systematically organize alternative learning activities which serve as vehicles to assist students toward achievement of the objectives. These activities must reflect the learning outcomes implicit in the stated objectives and include a wide array of media and varying organizational patterns to accomplish this end. This process involves the search for and the selection of commercially available print and non-print materials.

A unique feature of the training program is the option open for teachers to produce original materials that will be included in the SPOKE-PAKS. Self-instructional areas have been organized which enable teachers to learn various media production techniques. The areas are furnished with auto-instructional devices complemented by visual illustrations of the procedures.

Finally, evaluative criteria are developed in the form of pre-tests, self-assessment tests and post-tests to determine whether the objectives have, in fact, been achieved. Feedback information is provided through teacher and student evaluation forms included as part of each unit to assist in the validation of the packets.

An important outcome of the training process just described is the fact that six independent school districts have found a common basis for inter-community curriculum cooperation, development, implementation and validation. In addition to ideas being shared, the products of each are available to all.

Project SPOKE was established in February 1968 under Title III of the Elementary and Secondary Education Act of 1965. It is located in Norton, Mass.

Abstract No. 37 · Felsenthal

MEDIA, RACIAL IDENTIFICATION, AND LEARNING

Norman A. Felsenthal
Assistant Professor of Communication
Purdue University

As Prepared
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Until recently, a combination of whimsy and economics has caused instructional television and educational film producers to design omnibus productions for widely diverse audiences. The current trend, however, is for media producers to abandon their "shotgun" techniques and employ instead a rifle to "zero in" on highly specified target audiences. It is now economically feasible and some media producers are considering the production of alternate versions of specific media for utilization in schools with distinct ethnic populations.

This study tested the educational value of alternate versions of a tape-slide presentation for students from different racial groups. Reference group theory, and specifically the concept of racial identification, provided the theoretical framework for three research hypotheses. These included:

1. Children who perceive an instructional tape narrator to be a member of their own race will score significantly higher on a retention test than will children who perceive the narrator to be a member of a different race.

2. Children who perceive an instructional tape narrator to be a member of their own race will score significantly higher on the various dimensions of source credibility and will also rate as more acceptable the content the narrator discusses than will subjects who perceive the narrator to be of a different race.

3. The effects anticipated in the first two hypotheses will be greatest among students who are low achievers and least among students who are high achievers; i.e., race is a more important reference group for low achievers than for high achievers. As the importance of the reference group declines, the differences associated with the race of the narrator will diminish.

These three hypotheses were based on the postulate that members of a racial group do identify with others of their own race. The study developed and utilized a measurement of racial identification to test this key assumption.

Relationships between achievement and attitude which occurred independently of race of subject and race of narrator were also explored.

Eighth grade students from two public junior high schools, one in Des Moines, Iowa and one in Argo, Illinois (a south Chicago district), served as subjects. About forty percent of these students were black; the balance were white. Twelve intact classes were involved in the study and the total sample included 256 subjects. All of the subjects were exposed to a fourteen-minute instructional sound-slide presentation about African Bushmen. Upon completion of the instructional tape, subjects were given three successive tests.

The first test consisted of six semantic differential-type attitude measures. These were designed to measure concept acceptance, persuasiveness, and four dimensions of source credibility (trustworthiness, dynamism, competence, and pleasantness). The second test consisted of twenty multiple choice questions and was designed to measure the subjects' retention of information contained in the stimulus.

The third instrument was unrelated to the sound-slide stimulus. This racial identification test attempted to obtain a measurement of racial identity—to ascertain that the subjects do identify with their own racial group.

Two versions or treatments of the sound-slide stimulus were prepared for the experiment. In the first version, the narrator spoke in a standard or General American dialect, and three pictures of a white man, supposedly the narrator, were interspersed among the content slides to firmly establish that the narrator was Caucasian. In the second version, the narrator used a Negro dialect and three pictures of a black man were integrated among the content slides to establish both audibly and visually that the narrator was Negro. In actuality, the same person was utilized for both audio narrations, thereby eliminating the variable of personality which would have been confounded with ethnic voice were two different narrators employed.

Approximately one-half of the 256 subjects (six of the twelve classes) were exposed to the "white" version of the sound-slide stimulus. The remaining subjects were exposed to the "black" version. Both groups of subjects took the attitude, retention, and racial identification tests immediately after the sound-slide presentation.

A three dimensional analysis of variance design was utilized to statistically analyze the eight criterion

measurements–the six attitude scales, the retention test, and the racial identification test. Race of the subjects, achievement level of the subjects, and presumed race of the narrator (the treatment effect) were the three sources of variance in the analyses.

If racial similarity or dissimilarity between the sender and the receiver of a message affects the acquisition of knowledge and the formation of attitudes, then subjects should learn more from and also rate more favorably a narrator from their own racial group. Conversely, subjects should learn less from and rate less favorably a narrator from a different racial group.

Further, if the intensity of racial identification varies inversely with the achievement level of the subjects, then the race-narrator interaction should be greater for low achieving members of both racial groups and less for high achieving members of both groups.

No triple interaction (race by treatment by achievement level) was significant in any of the analyses performed. Only one race by treatment interaction was significant in the direction predicted by the hypotheses. This interaction involved the trustworthiness dimension of the source credibility scales for the Argo subjects.

When the three main effects of the analyses–race, treatment, and achievement–were examined separately, no significant differences in retention or any of the six attitude scales could be attributed to the race and treatment factors. A pattern of significant differences was found among achievement levels, however. As expected, high achieving students performed best on the retention test, followed by middle and then by low achievers. More surprisingly, high achieving students rated the narrator higher on the six attitude scales than middle and low achieving students. Differences between high and middle achievers were not great generally, but differences between both of these groups and the group of low achievers formed a uniform pattern. Low achieving students consistently perceived the narrator less favorably than other students did.

None of the three hypotheses stated earlier can be accepted on the basis of evidence from this study. The racial identification test clearly indicated that black subjects identified more with Negroes than whites and whites identified more with whites than Negroes. Nevertheless, this difference in reference groups had no significant effect on interaction between race of subjects and perceived race of narrator when retention, attitude toward content of narration, or source credibility were the criteria.

If we give full credence to the results of the analyses, we must conclude that black and white students learn equally well from mediated teachers (and perhaps from classroom teachers) of similar or dissimilar racial backgrounds. Obviously I am not willing to draw these conclusions from my own limited research.

Three weaknesses in the study should be noted. First, the representational quality of the subjects may have been faulty. Trends in the data of Argo students were in the hypothesized direction though not significant. Trends for the Des Moines subjects were in the opposite direction, almost as if the Des Moines students both white and black were making a special effort to demonstrate their lack of racial prejudice by giving higher attitudinal ratings to the narrator from a racial group different from their own.

Second, the experiment was administered by the researcher which assured a uniform presentation but also introduced the possibility of a laboratory or "Hawthorne" effect. Third, the sound slide presentation may have been topic-bound.

Further experimentation with a larger and more carefully selected sample of students is now needed to examine in greater depth the effects of racial identification in mediated and non-mediated instruction on the cognitive and affective processes.

Abstract No. 38 Reid

PRINTED COMMENTS WITH ITEM ANALYSES

J. Christopher Reid
Associate Professor of Education
Consultant in Instructional Research
University of Missouri
Columbia, Missouri 65201

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Faculty members often use automatic test scoring services to grade tests and obtain a frequency distribution of total scores. However, the faculty member who has not had training in measurement often ignores such item analysis statistics as discrimination and difficulty indices, since they do not clearly show him how he can improve his items.

The research worker can help the teacher improve his test items by incorporating a list of recommendations in the form of a decision matrix into a computer program. The machine computes the item statistics for each item and then searches the list to see which recommendation it should select, given data of these particular values. The computer then prints not only the conventional item statistics, but also the English recommendation selected that suggests specific ways to improve that item. These comments are printed alongside the item statistics.

The researcher can program any list or matrix of decisions that he wishes. However, some guidelines are offered. First, any printed comments should be easy enough for the teacher to follow without further assistance. Second, most instructional technologists will agree that the program should be flexible so that it can print comments appropriate to "criterion-referenced" items or to "norm-referenced" items. This flexibility implies that some printed comments may suggest a revision of the instruction as well as a revision of the item.

An item analysis with English comments helps faculty members interpret item statistics more readily, speeds the improvement of test items, and particularly with criterion-referenced items, helps the improvement of instruction by pinpointing concepts presented in the instruction that were unclear to the students, and that should be revised before the next time of presentation.

Abstract No. 39 McMahan

A STUDY OF THE FEASIBILITY OF A SYSTEM OF PRE-SERVICE TEACHER EDUCATION IN MEDIA

Marie E. McMahan, Director
Instructional Resources Center
Kent State University

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This study investigated the feasibility of designing a system for developing media selection and utilization competencies in existing education and methods courses by: (1) identifying nine desirable competencies for initial development at the pre-service level, (2) procuring the judgments of representative elementary education professors at Michigan State University regarding optimum points in the elementary course sequence for initial development of each competency, (3) deriving system design procedures from the literature, and (4) testing on a pilot basis in one course the system procedures for developing media selection and utilization competencies.

Summary and Conclusions

The conclusions are:

1. That findings of student and faculty surveys to ascertain the degree of media competency development of prospective elementary teachers at Michigan State University demonstrate a substantial need for improving current methods of developing these competencies.

2. That the substantial agreement of professors interviewed regarding appropriate points in the elementary education sequence for introduction of specified media competencies indicates the desirability and feasibility of a systematic approach to media competency development.

3. That professors' recommendations regarding points at which specific media competencies should be introduced suggest a logical sequence of competency development in existing elementary education and methods' courses.

4. That steps for system design derived from the literature and applied to planning for competency development in one course are practical and helpful.

5. That, following use of such procedures, students reported significantly more media experiences than they had at the beginning of the course.

6. That members of the post-student teaching group reported more media experiences at the beginning of the course and greater growth in media experiences during the course than those who had not participated in student teaching.

7. That students using self-instructional programs on media selection and utilization were able to suggest applications in other situations of the principles developed in the programs.

8. That the system, as initially tested, should be redesigned to place greater emphasis on psychological organization.

Recommendations

The recommendations of this study are based on three assumptions: (1) that prospective teachers need to acquire certain basic media competencies, (2) that a media course is not the complete answer for the development of these competencies, and (3) that alternative answers to the problem need to be tried.

As a result of the findings of this study and the review of pertinent literature, the following recommendations are made:

1. That media professionals and teacher education faculties collaborate in identifying media competencies and attitudes which they want prospective teachers to acquire.

2. That a systematic approach to development of these competencies within existing education and methods courses be planned.

3. That such an approach take into consideration the background and needs of individual prospective teachers and relate media competency development to purposes which are important to faculty and students.

4. That such an approach identify and take advantage of the instructional roles which can best be

(McMahan, cont.)

played by faculty members and by multi-media self-instructional programs.

5. That planners consider the following steps in developing the proposed system of teacher education in media:
   a. *Goal identification* (i.e., deriving system objectives from the identified media competencies).
   b. *System analysis* (i.e., specifying functions to be performed by the proposed system).
   c. *System synthesis* (i.e., incorporating these functions into a system model).
   d. *System try-out and evaluation* (i.e., testing the proposed model).
   e. *System redesign* (i.e., redesigning the model as necessary for more adequate goal achievement).
6. That, in order to facilitate acceptance of the system, planners take the following into account:
   a. The kind of climate that encourages change.
   b. The role of administrators, innovative staff members, and "respected others" in change.
   c. The role of adequate support staff, materials, and facilities in change.
7. That system planners evaluate the system by determining whether it does the following:
   a. Achieves identified goals.
   b. Adapts to needs of students with varying backgrounds, attitudes, and perceptions in relation to media.
   c. Allows both teachers and students to function in a creative manner.
   d. Utilizes the unique capabilities of both teachers and media.
   e. Facilitates better communication and cooperation among its components.
   f. Facilitates analysis of when and how it (i.e., the system) needs to change.

Abstract No. 40 Wiederanders

EFFECT OF BRIGHTNESS LEVELS ON VISUAL MESSAGE RECEPTION FROM CLASSROOM FILMS

Richard A. Wiederanders
Director, Educational Media
Wartburg College
Waverly, Iowa

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The assumption is usually made that films are best shown in the dark. Classrooms are adapted for film showings by making them as dark as possible. A classroom designed for film showings then, would be one which could be made very dark, reducing minimum screen brightness to the lowest possible level.

This study takes place in a classroom designed for use of film, in which the teacher, from the front of the room, controls not only the rear-projection system, but all forms of room lighting. The brightness levels observed on the screen by a particular student depend on the level of general room illumination, and on his seat location relative to the screen. The purpose of this study is to measure the effect of a wide range of room brightness levels on the students' reception of the film's message.

A distinction is made here between the message of the film, encoded in the film medium by the producer and selected for the class by the teacher, and the visual signal presented to each student, consisting entirely of variations in brightness on the projection screen. This study attempts to relate success in message reception to maximum and minimum brightness levels in the projected signal, and to the comparison between screen brightness and brightness in the off-screen learning environment, produced by general room illumination.

The viewing test is an adaptation of a film previously chosen for presentation to this class. Students are alerted to the coming of a short test sequence, during which the sound will be cut. Fifteen to twenty minutes after the film starts, the sound fades and the film is viewed in silence for two minutes. Then sound is restored and the film runs another two minutes to its end. Immediately following the film, students are asked to fill out the viewing test form, in which they are to tell all they can of the characters, the scene, and the action during the silent sequence.

Seat locations are grouped by side viewing angle in three zones, from 0^{o} to 60^{o} off the projection axis. Four room lighting conditions range from maximum incandescent light level to screen and exit lights only. Screen brightness ratios range from over 200/1 down to 2/1. As room illumination is varied, task surface brightness ranges from less than 1/200 of screen brightness to four times that figure.

Seating assignments and viewing test selections are carefully randomized. Scores on three different film tests are combined by a normalized T-score transformation, and analyzed in a 3x4 factorial analysis of variance, to evaluate the effects of side viewing angle and lighting condition. Effects of screen brightness ratio and screen/task surface brightness ratio are analyzed graphically.

The effect of side viewing angle is significant at the 5% level, as the result of lower scores from angles greater than 40^{o}. The well-documented disadvantage for viewers outside the "cone" is again supported. No evidence is found to support assumptions that viewing scores are affected, either positively or negatively, by the variations in room lighting or by the attendant variations in the screen brightness ratios and screen/task surface brightness ratios.

The writer concludes that in well-designed rear-projection-equipped classrooms, with artificial lighting only, the success of a film communication event, as measured by the message received, is not dependent on either room darkening or high screen brightness ratios, or a match between screen and task surface brightness. The individual student's visual learning performance is the controlling factor.

STANFORD UNIVERSITY

STANFORD, CALIFORNIA 94305

The ERIC Clearinghouse on Educational Media and Technology
The Institute for Communication Research
Cypress Hall
Telephone (415) 321-2300 Ext. 3345

March 22, 1971

ERIC at Stanford is pleased to be able to cooperate with the AECT Research Committee and Keith A. Hall in making these abstracts available for distribution at the convention.

While the supply of the printed abstracts is limited, the clearinghouse has the whole collection available on a microfiche, and would be pleased to respond to a request for a complimentary copy. In addition to the 21 abstracts, that microfiche also contains the complete report, Trends in Instructional Technology, which William H. Allen helped prepare for the clearinghouse.

The abstracts are listed on the back of this letter in the order in which the papers are to be presented during the convention.

Don H. Coombs
William J. Paisley

Clearinghouse Co-Directors

"ERIC, Stanford, Ca. 94305" is an Adequate Address for Clearinghouse Correspondence

Research Abstracts for 1971 AECT National Convention

1. Donald S. Campbell and Thomas H. Schwen, "Beyond the Remedial Loop: The Integration of Task and Learner Analysis for a Process Approach to Instructional Development"
2. Linda DeCarlo, "A Comparison of Instructional Methods and Student Attitudes for a Basic Course in Art History and Appreciation"
3. Robert M. Diamond, Thomas Regelski, and Donald J. Lehr, "An Individualized Approach to Music for the Non-music Major"
4. Robert E. Stephens, "Those Who Do and Those Who Don't–Media Utilization in Higher Education"
5. Jack H. Bond, "An Effectiveness Index and Profile for Instructional Media"
6. Edward E. Lewis, "A Study to Determine Teachers' Perceptions in Relation to Educational Media"
7. Dan Lee Isaacs, Lawrence M. Aleamoni, Margaret Pjojian, and Sarah B. Eitelbach, "A Comparison between Library Science 303 Taught by the Regular Method ('Live' Instruction) and Taught via Telelecture"
8. Magnus Haavelsrud, "Learning Resources in the Formation of International Orientations"
9. Myles P. Breen and Jon T. Powell, "An Investigation into Children's Perception of the Attractiveness and Credibility of TV Commercials"
10. Edward F. Newren and Malcolm S. Ferguson, "The United States-Japan Science Film Exchange Project: An Interim Report"
11. George L. Morris, Jr., "Evaluation of the Effectiveness of a Commercially Produced Multi-Media Health Package in Field Settings"
12. Michael A. Hirrel, "Results of a Study on How the Effects of Selected Programmed Instruction Techniques Vary with Individual Differences"
13. Yih-wen Chen, "Visual Discrimination of Color Normals and Color Deficients"
14. Fred H. Jurgemeyer, "The Effect of Color and Graphic Form as Stimulus Factors in Paired-Associate Learning"
15. Ronald W. Spangenberg, "Procedure Learning and Display Motion"
16. Seymour A. Sommer, "The Use of Silent Single Concept Loop Films to Facilitate the Acquisition of Occupational Skills"
17. Thomas G. Nielsen, "Presentation Media and Representation Modes in Independent Learning"
18. Peter T. K. Tam and Robert H. Reeve, "The Study of the Image-Accumulation Technique As a Variable in Multiple Image Communication"
19. Don Del Marr Wiley, "The Effects of Various Rates of Reverse and Slow-Motion Projection on the Acquisition of a Film-Mediated Performance Motor Task"
20. Sarah H. Short, "The Use of Compressed Speech Tapes in a Multimediated Learning Laboratory"
21. Robert George, Robert Lantz, Robert Leturges, Rickey Miller, and Gail Phegley, "Retention of Non-Related Self-Contained Messages Presented Simultaneously Via the Audio and Visual Channels"

Abstract No. 1 Campbell and Schwen

BEYOND THE REMEDIAL LOOP: THE INTEGRATION OF TASK AND LEARNER ANALYSIS FOR A PROCESS APPROACH TO INSTRUCTIONAL DEVELOPMENT

As Prepared
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Donald S. Campbell, EPDA Fellow
Thomas H. Schwen, Assistant Professor
Division of Instructional Systems Technology
School of Education
Indiana University
Bloomington, Indiana 47401

Task analysis, as currently defined in the literature, is more or less limited to those instructional situations in which the instructional developer can be in large measure confident of his ability to map responses directly on stimuli. This domain is characterized by content which is essentially formal and behavior which is task-specific, and may most often be found under the heading of training.

To go beyond this domain, into content which is thematic, as opposed to formal, and into behavior which is task-general, requiring of the learner manipulation of principles, transfer, stimulus differentiation and selectivity, necessitates modification of current task analysis procedures.

It is argued that a developer must begin to go beyond S-R Theory into what has been described as S-r-R Theory, thus enabling in his analysis, examination of individual differences (aptitudes, abilities, styles, and other personological variables) and the description not only of terminal overt behaviors, but also the course of acquisition of those behaviors and how it might differ among sub-populations of learners.

The source of information for task analysis then shifts from the content-specialist alone to include the learner as representative of a defined sub-population who interacts in a unique fashion with the specified content. The greater our understanding of this interactive process resulting from individual differences, the less we will have to rely on remediation models of instruction and their inherent uncertainty. The analysis process thus becomes one of simultaneous task and learner analysis. It goes beyond paradigm and offers through its multivariate approach implications for specification of instructional treatments for sub-populations, hypothesis testing, and perhaps occasional insights into the learning process.

An example of a recent developmental research project is offered to demonstrate application of the technique.

Abstract No. 2 DeCarlo

A COMPARISON OF INSTRUCTIONAL METHODS AND STUDENT ATTITUDES FOR A BASIC COURSE IN ART HISTORY AND APPRECIATION

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Linda DeCarlo
Instructional Media Intern
Department of Instructional Photo/Graphics Productions
Brigham Young University
Provo, Utah 84601

As a general education requirement, a course in history and appreciation is required by the sponsoring institution. The approach that most of the instructors have taken over the years is to use a "travelogue" approach to the subject, as the student is exposed to various works of art, from different cultures at different periods of time. Generally this is done through the medium of 35mm slides with the instructor narrating. There has been no pre-test and the criterion applied to measure successful completion of the course was the students' ability to recall and identify the slides.

Given the geographic location of the institution and other factors that limited accessibility to first-hand observation of much of the subject matter, it was agreed that the use of instructional media was indeed the logical way to present the information to the student. Inasmuch as the subject is in the area of the visual arts it was further concluded that visual media should be emphasized in the content presentation. While not arrived at in the objective fashion that these first two decisions were, it was further agreed that recall or memorization level learning might be an adequate way to gain the desired information.

Thus the instructional design problem became: "How can the instructor better do what he is already doing?"

To this end the following improved visual identification approach was constructed:

1. Slides identifying *key concepts* would also be presented to the student—vs. the verbal-treatment-only approach previously used.
2. *Maps* showing geographic areas of concern were developed and coordinated with the earlier pictorial material.
3. *Graphs*, including time lines, were used to help identify art objects chronologically.
4. *Multi-image* projection techniques were devised to permit simultaneous presentation of information which may include items 1, 2, and 3 above plus the painting or sculpture under consideration. Another use of the *multi-image* technique was to present various aspects of the same item at the same time. For example, the front, back and side views of a statue.

In addition to an improved visual presentation technique, a pre-test, instructional objectives and revised post-test have been constructed.

Although validation is not yet complete, preliminary student and instructor reactions are most encouraging. To date there have been fewer students drop the course than with the earlier approach, class attendance is up, and attitudes seem much more positive. Evaluation is in progress this semester to confirm these observations and the results should be available from the author after August 1, 1971.

AN INDIVIDUALIZED APPROACH TO MUSIC FOR THE NON-MUSIC MAJOR

Robert M. Diamond
Assistant Vice Chancellor for Instructional Development
Syracuse University
Syracuse, N.Y. 13210

Thomas Regelski
Assistant Professor of Music
State University College
Fredonia, New York 14063

Donald J. Lehr
Assistant Professor of Psychology
State University College
Fredonia, New York 14063

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Following a pilot study, the State University College at Fredonia, New York, designed and implemented an individualized course in music for the non-music major. Following a systems approach, the course that evolved was unique in both concept and design. The presentation of information and the introduction of new concepts was covered by the use of "structured" independent learning units. These units, over 40 in number, ranged from audio units to tape-slide sequences, branching programed booklets with audio elements, and film and televised presentations. This approach permitted an increased number of seminars to be offered and also allowed student options to be included as the course progressed.

According to their performance on a course pre-test, students were assigned remedial units to meet general instructional prerequisites. An extensive student manual contained, in addition to general course information, a statement of behavioral objectives for each unit, work sheets, and selected scores.

The course is proving to be instructionally effective, well-liked by students, and efficient in both student and faculty time and space utilization. Students show significant improvement at the $p = .01$ level for each of the four modules as measured by equated pre- and post-tests. In addition, and perhaps even more important, the achievement in the course between students without any musical background when compared with those with training in the area has been substantially reduced and, for some modules, eliminated.

Abstract No. 4 Stephens

THOSE WHO DO AND THOSE WHO DON'T–MEDIA UTILIZATION IN HIGHER EDUCATION

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Robert E. Stephens
Director of Instructional Media
Ambassador College
300 West Green Street
Pasadena, California 91105

Data for this study were gathered from 678 questionnaires received from 390 faculty members, 138 academic deans, and 150 audiovisual personnel at 201 colleges and universities.

Sections of the questionnaire were designed to assess:

1. Attitude toward instructional technology, using a Lickert-type scale.
2. The perception of deterrents to the utilization of media–whether perceived as major, moderate, or minor or no deterrent.
3. Perceived effectiveness on utilization of media by recommended administrative and/or physical changes at the respective institutions.

Hypotheses tested by chi square indicated that significant differences existed between:

1. Experience and media utilization–those faculty members with more experience had higher utilization rates.
2. Media utilization and perception of deterrents to media utilization–those faculty members with higher utilization rates perceived more major deterrents.
3. Media utilization and attitude toward instructional technology–those faculty members with higher attitudinal scores had higher utilization rates.
4. Perception of deterrents and attitude–those faculty members with higher attitudinal scores perceived more major and moderate deterrents.

Positive correlations also existed between media utilization and attitude and between media utilization and perception of major deterrents.

The top ten major deterrents, from a list of thirty as indicated by a compilation of all responses, were related to:

1. Lack of knowledge and training in the preparation and utilization of audiovisual materials.
2. Lack of knowledge of available audiovisual services.
3. Lack of time to plan for and utilize audiovisual materials.
4. Shortage of appropriate materials.
5. Shortage of finances.
6. Incompatibility of audiovisual methods with some faculty members' philosophy of education.
7. Lethargy or resistance to change among faculty and administration.
8. Circulation of equipment and materials.
9. Lack of organization and/or planning in instruction.
10. Inadequately designed classrooms.

Recommendations in order of perceived effectiveness on utilization were for increased academic and audiovisual budgets, more and better classroom facilities designed for media utilization, an increased variety of appropriate materials, more media personnel, and provision for demonstrations and workshops. Also recommended was more equipment, more release time for faculty devoted to course planning and development of materials, more information on available services and materials, and improved communication among faculty, administration, and audiovisual department.

Abstract No. 5 Bond

AN EFFECTIVENESS INDEX AND PROFILE FOR INSTRUCTIONAL MEDIA

Jack H. Bond
Research Coordinator, Computer Based Project
Syracuse City Schools (Prescott)
410 E. Willow Street
Syracuse, N.Y. 13203

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Although many attempts and numerous studies have been conducted to determine the relative value of various media, the question of who is to judge appropriateness—and the question of the meaning of a measure of benefit, effectiveness, or gain—remain issues. Present classifications and evaluations rely almost exclusively on the judgement of practitioners. In the evaluation process, developing appropriate criterion items becomes a crucial element.

In an effort to increase the effectiveness of this judging process, children have been used as indicator of both the criterion items and the media effectiveness unbiased by practitioner influences. Partitioning of the post-test scores into several components of error, prior knowledge, guessing, and gain gives an index of effectiveness for the media with a given population.

Post-test Score	=	Effect Learning Exercise	+	Guessing	+	Prior Knowledge	+	Error

If estimates of some of these components could be obtained, the true learning effect value of a given experience might become an index for comparison with other levels of respondents, for comparing one question with another, etc. The prior knowledge component could be estimated by a pretest. The estimate for guessing can be statistically determined as a ratio based on the number of known (given) response choices and the number accepted as correct. If these component estimates are subtracted from the post-test score, that remaining would be the effects of learning and error.

If we look at the error component we see that its effect is one of depressing the post-test score from a perfect measure and detracting from the learning effect component. As a result of controlling for error factors, higher learning indexes would result, however by combining the error with the learning effect an index of effectiveness still emerges which may have a positive or negative value. The important aspect of manipulation is that an index *does emerge* after controlling for guessing and prior knowledge. As the error of measurement in test situations decreases and respondent variables become controlled, the index would reflect more of a true learning effect. Under less desirable situations the index is perceived as indicating a *minimal* effectiveness of the media or a test item.

The index has been applied as a selection criteria for multiple choice questions generated to measure objectives of instructional films. Estimates of guessing and prior knowledge effects are subtracted from the post-test score for the question, resulting in an index of gain or learning as measured by the question. A negative index indicates error factors in the question causing polarization on a response choice that is not judged the correct choice. The index for the question was used to assign (or verify assignment) of grade, age, or achievement levels for the question. A high prior knowledge score indicates item simplicity in terms of the responding population, whereas a high learning index indicates a good match between question, media and respondent.

An average of the positive question index values serves as an index of a given medium's effectiveness, using the question set as the instrument. The indexes from several media on the same subject matter would allow some comparison. Adding the results of observed attention spans, vocabulary levels, curriculum classes, and subject descriptors, a profile of a given media becomes apparent. This profile can then serve to indicate the suitability for a given level of child, a given content unit or a given level of skill development. The profile of one media can be contrasted against that of another to ascertain differences and similarities in media effects. The profiles could be used to develop skills independent of content areas. Several companion studies have indicated the index is useful when comparing captioned vs. non-captioned films and audio vs. visual presentations, and when obtaining vocabulary levels of media.

Abstract No. 6 Lewis

A STUDY TO DETERMINE TEACHER PERCEPTIONS IN RELATION TO EDUCATIONAL MEDIA

Edward Eugene Lewis
Associate Professor (AV) of Education and Psychology
Southeast Missouri State College
Cape Girardeau, Missouri 63701

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The problem was to determine the degree, if any, to which the teachers' cognitive domain interacted with his affective domain when educational media were involved in the teaching-learning situation. The problem involved structuring and administering a questionnaire to a group of classroom teachers in a large school system. Resulting data were classified into independent or cognitive variables, and dependent or affective variables, so that significant relationships could be tested to acquire knowledge of teachers' perceptions of educational media in a public school classroom situation.

The procedures involved the administration of the questionnaire during the school year 1968-1969 to an entire school system in a large city which yielded a 53% return of 733 usable questionnaires. Results were analyzed by Chi-square.

Conclusions

Teachers perceive that the school board provides enough budget for educational media, that their curriculum coordinator encourages them to use educational media, that their principal encourages them to use educational media, that their department head encourages them to use educational media, that their building representative encourages them to use educational media, and that educational media are easy to obtain for their classroom.

Teachers perceive that they would use even more educational media if it were easier to obtain for their classroom, that educational media fits into the curriculum which they teach, that educational media are liked by their students and that students learn easier and faster when educational media are used, that their peers should use more educational media, and that future training in the area of educational media is not necessary.

More female teachers perceive that educational media are useful to them than do male teachers. Elementary teachers, grades 1-6, have higher levels of awareness and use of educational media than do junior and senior high school teachers. Age is not a clearly relevant variable in the study of teachers' perceptions relative to educational media, and neither are years of teaching experience. Formal training, including pre-service, in-service, and outside time spent on educational media, also is not a clearly relevant variable in the study of teachers' perceptions relative to educational media.

Recommendations

1. There is a need to inform teachers of the array of educational media available to them in a large school system.
2. There is a need to acquaint teachers on the junior and senior high school levels with the uses of the array of educational media available to them.
3. There is a need to inform male teachers on all grade levels of the availability and uses of media.
4. There is a need for further study of teachers' perceptions of educational media in the classroom along with encouragement of teachers to pursue formal educational media training.
5. There is a need for professional educators to become more aware of teachers' current perceptions of educational media in order that more utilization may be made of available educational media.

Abstract No. 7 Isaacs, Alcamoni, Pjojian and Eitelbach

A COMPARISON BETWEEN LIBRARY SCIENCE 303 TAUGHT BY THE REGULAR METHOD ("LIVE" INSTRUCTION) AND TAUGHT VIA TELELECTURE

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Dan Lee Isaacs
Lawrence M. Alcamoni
Margaret Pjojian
and Sara B. Eitelbach
University of Illinois
Urbana, Illinois 61801

Telelecture is a system of two-way verbal communication that allows an instructor to teach a course in more than one location at a time. Though there is no direct visual link, instructional materials may be available and displayed at each location.

In the spring semester of 1970, Library Science 303 at the University of Illinois was taught in two locations simultaneously by the same instructor: one "live," the other in a remote classroom via Telelecture. The purpose of the investigation was to determine if there would be any cognitive and/or affective differences between students taught by the two methods.

Forty-one students, who signed up for the course unaware of the experiment, were randomly assigned: twenty-four in the control group ("live") and seventeen in the experimental group (Telelecture). Preliminary information consisting of ACT,[1] HSPR,[2] and SI[3] was obtained for each student. In addition, an affective test called the CEQ[4] was administered during the first day of class. At the conclusion of the experimental period, the students were given an objective test on the materials presented in the course and the CEQ was administered again to see if there had been any change in attitudes during the experiment.

An analysis of covariance was used in analyzing the data of this experiment; results indicated that there was no significant difference between the two groups when measured on the cognitive aspect. However, due to uncontrollable circumstances (teacher compensation, missing preliminary data, and high absenteeism due to a general university student strike), it cannot be said conclusively that students learn material as well via Telelecture as they do with "live" instruction.

The analysis of covariance on the affective aspect revealed that attitudes of both groups toward the method of instruction had become more similar by the end of the experiment, with both groups becoming less favorable than initially toward the method of instruction used. However, the analysis showed no significant differences.

[1] American College Tests

[2] High School Percentile Rank

[3] Selection Index--the student's predicted first semester grade point average based upon a linear combination of ACT and HSPR, and calculated during the processing of his admission application.

[4] CEQ - Course Evaluation Questionnaire--an instrument designed by Richard E. Spencer to gather responses to a "standardized set of statements relative to certain standardized aspects of an instructional program which enable an instructor to adequately compare his results with results of other instructors."

Abstract No. 8 Haavelsrud

LEARNING RESOURCES IN THE FORMATION OF INTERNATIONAL ORIENTATIONS

Magnus Haavelsrud
Lecturer
College of Education
University of Washington
Seattle, Washington 98105

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The purpose of the study was (1) to assess the relative impact of various sources on the acquisition of certain international orientations and (2) to determine the effect of four school sources (teacher, TV in school, movies in school, and textbooks) on answers given to ten different questions on international matters. The sample consisted of 197 high school students drawn from a population of 2000 in a school district in Seattle.

Previous research findings suggested that the following sources exert varying impact in the socialization process: family, school, mass media, and peers.

Dependent variables consisted of answers given mostly to open-ended questions on peace and war. Independent variables were ratings of sixteen sources of orientation on each of ten major questions (one question posed on each page of the instrument). Using each page as a treatment and each subject as a block, scale ratings between pages were analyzed by a block design analysis of variance. Twelve of the sixteen ratings on each page were found to be significantly different over the pages. Duncan's New Multiple Range Test was used to find which treatments (pages) differed from each other significantly.

The results indicate great variation in source usage dependent upon orientation measured. Mass media, school, and father are of high utility in the acquisition of the concept of war. The concept of peace is largely acquired through mother, others in family, friends, two mass media sources, and religion. Causes of war are mainly learned from the same sources as the concept war, with the exception of father. Prevention of war is an area where none of the sources is of high utility. Moral judgment of war is mainly acquired through father and textbooks. No source is listed of the same importance in acquiring views on the possibility of avoiding war.

The four school sources have varied impact on the orientations acquired. Teachers are of higher utility in learning about war than learning about prevention of war and the nature of war. Textbooks seem to convey more information on war than on peace, whereas this source is more viable in learning about the morality of war than about war itself. Movies in school are also generally utilized more in the formation of the war concept than on the other dimensions.

Textbooks are of less utility in the acquisition of attitudes related to peace than in receiving information on causes of war. Teachers are of more utility in acquiring the peace concept than ideas about preventing war.

Teachers have a greater impact on orientations towards morality of war than orientations toward peace. Teachers and textbooks are more viable agents in the formation of beliefs about avoidance of war than in the formation of the peace concept.

Movies in school are of less utility in acquiring orientations towards the problem of avoiding war than in the learning about what causes war. Teachers, textbooks, and movies in school are of less importance in the acquisition of beliefs about man than in learning about causes of war. Likewise, textbooks are of less utility in learning techniques of preventing war than in forming orientations towards morality of war. Teachers, textbooks, and movies in school are sources of more importance in acquiring orientations to morality of war than basic beliefs about man.

Abstract No. 9 Breen and Powell

AN INVESTIGATION INTO CHILDREN'S PERCEPTION OF THE ATTRACTIVENESS AND CREDIBILITY OF TV COMMERCIALS

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Myles P. Breen
Assistant Professor, College of Education
John T. Powell
Associate Professor, Department of Speech
Northern Illinois University
De Kalb, Illinois 60115

This study investigated children's attitudes toward TV commercials. Specifically, it was designed to determine if children like commercials they perceive as real, or believe commercials that they like. Preferences to type of commercials which might emerge from age, grade or sex groupings were also investigated.

Four randomly selected commercials were shown in the classroom to grades two through five. In all there were 196 subjects, 106 boys and 90 girls.

The test instrument consisted of four pages numbered and color coded–one for each commercial. The respondents were asked to make an X to indicate their preference on six scales immediately after viewing each commercial.

The scales were:

1.	True	I don't know	False
2.	Happy	I don't know	Not happy
3.	Real	I don't know	Not real
4.	Stupid	I don't know	Smart
5.	Nice	I don't know	Not nice
6.	Good	I don't know	Bad

Assuming the scale produced interval data, each scale was coded from one in three in value as follows:

False = 1, I don't know = 2, and True = 3, and similarly for the other scales.

The Credibility dimension was found by summing the scores of scales 1 and 3 (Real and True). A Pearson correlation of .61 ($p = .002$) between these scales provided adequate justification for this procedure. Similarly, the likeability dimension was found from the sum of the scores of scales 5 and 6 (Nice and Good). A Pearson correlation ($r = .63$, $p = .002$) between these scales also provided adequate justification for this procedure.

Results and Discussion

1. Credibility and likeability were found to be positively correlated, $r = .26$ ($p = .002$) for a two-tailed test of significance.
2. Likeability and age were negatively correlated, $r = -.17$ ($p = .016$).
3. There was no significant correlation between credibility and age, $r = .04$ ($p = .52$).
4. Credibility was significantly correlated with sex, $r = .15$ ($p = .030$).
5. Likeability was significantly correlated with sex, $r = .23$ ($p = .002$).
6. The children responded to each commercial individually, e.g. they exhibited different responses to Alka-Seltzer and One-A-Day.
7. Contingency table comparison of all four commercials on each of the six scales gave further evidence of the children's willingness to make selective judgments. Out of the 36 possible comparisons only 14 were not significantly different at the 5% level (Chi Square > 5.99 at 2 df), and 19 comparisons exceeded a chi square value of 12.12 ($p > .001$).

Conclusions

1. Children tend to believe in the commercials they like, and like the commercials they believe in.
2. Children are capable of making selective value judgments about the cleverness, happiness, truth and reality of the message.
3. The younger children tend to like commercials more than the older children do.
4. Girls tend to like and believe commercials more than the boys do.

Abstract No. 10 Newren and Ferguson

THE UNITED STATES-JAPAN SCIENCE FILM EXCHANGE PROJECT: AN INTERIM REPORT

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Edward F. Newren
Assistant Professor
College of Education
Audio-Visual Laboratory
University of Minnesota
Minneapolis, Minnesota 55455

Malcolm S. Ferguson
Executive Vice President
American Science Film Association
7720 Wisconsin Ave.
Bethesda, Maryland 20014

This project, part of the United States-Japan Science Cooperative Program, is to determine the benefits to science education, at various academic levels, from the exchange of science films between this country and Japan.

In this country, the film exchange, now in its fourth and final year, is sponsored by the National Science Foundation and administered by the American Science Film Association (ASFA). In Japan, the Japan Society for the Promotion of Science is the sponsor and the project is administered by the National Science Museum.

The science films interchanged in this project were initially evaluated by each of the participating countries before exchanging. These films were then re-evaluated by each of the receiving countries. The United States sent 265 films and received 180 films as a part of this exchange endeavor.

To determine the quality and usefulness of the Japanese science films for science education in the United States, a two phase evaluation program has been initiated. In Phase One, the films have been evaluated across the country, mainly by professionals at the higher education level--content specialists, audience level specialists, and production specialists. These evaluations were coordinated by persons with experience in audiovisual education as well as science and science teaching. Phase Two is designed to get these films into the hands of those who can provide meaningful evaluation and reactions as to the films' strengths and weaknesses for science education--science teachers and their students.

A descriptive analysis of the evaluation program used by the United States to assess the Japanese science films and the evaluative findings concerning these films, to date, will be presented as well as conclusions which have been drawn from the exchange experience and implications for possible future related activities.

Abstract No. 11 Morris

EVALUATION OF THE EFFECTIVENESS OF A COMMERCIALLY PRODUCED MULTI-MEDIA HEALTH PACKAGE IN FIELD SETTINGS

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George L. Morris, Jr.
Project Administrator and Program Evaluator
700 CTU Building
1221 "N" Street
Lincoln, Nebraska 68508

The Purpose of the Study

The purpose of this study was to evaluate the usefulness of a multi-media health package in training nurses at local hospitals in coronary care procedures. On the basis of this evaluation, inferences were to be drawn regarding the effectiveness of highly structured, media-supplemented, coronary care instruction conducted away from major teaching hospitals.

The Procedure

The ROCOM Multi-Media Training System for Intensive Coronary Care was selected for evaluation. This package consisted of participant textbooks, workbook, programed 8 mm films and film strips, and audio tapes. In certain sites, the Arrhythmia Anne and the Tutor 202 with 57 Tapes of arrhythmia patterns were also tested. The participants were 503 RN's and LPN's from Nebraska and South Dakota. All instruction was presented by existing health personnel in local hospital communities.

The study was conducted at 13 hospitals of bed sizes from 20 to 208. At some of these hospitals the Arrhythmia Anne and the Tutor 202 were employed as a supplement to the ROCOM. At the control sites, two hospitals of 70 beds and 94 beds respectively, coronary care training was conducted using the textbooks, but no media.

The ROCOM pre-tests and post-tests were administered and evaluated using both parametric and non-parametric analysis of variance. Attrition rates and participant evaluations of the course were also collected. Cost data were assembled.

Findings

Analyses of the pre-test and post-test scores supported the conclusion that although significant differences were found to exist at the $p = .01$ level of confidence, this could not be attributed to methods of instruction. The average attrition rate at the media sites was 8%; at the non-media sites it was 40%. Participant evaluations of the media materials were consistently positive and enthusiastic. Doctors and nurses reported improved patient care. Sites using these media were characterized by a general increase in requests for more similar high quality materials. Average participant cost was $62.23.

Recommendations

1. Follow-up studies should be made to evaluate the retention of the participants under the several training conditions.

2. A study should be designed to trace over an extended period the learning and retention of a group of medical center trainees and a matched group of hospital site trainees using the ROCOM. This study should include an evaluation of allied attitudes governing continuing education and professional growth.

Abstract No. 12 Hirrel

RESULTS OF A STUDY ON HOW THE EFFECTS OF SELECTED PROGRAMED INSTRUCTION TECHNIQUES VARY WITH INDIVIDUAL DIFFERENCES

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Michael A. Hirrel
Consultant in Educational Technology
Police Training Commission
7 Church Lane, Room 16
Pikesville, Maryland 21208

For this study, an entire seventh grade class in one school was chosen in order to use a learner distribution that was not seriously affected by academic dropouts. Only block design problems and the requisite number of blocks were used in the pretest, the program and the criterion problem in order to approximate as closely as possible non-verbal and cultural-free learning materials. A short linear program consisting of block design problems was specifically developed for seventh grade level pupils.

The research design looked at the performance of three ability levels (high, middle, and low) divided by sex over five program treatments: control, program, group paced, cues removed and sequence mixed. Sixth grade Lorge-Thorndike scores were used to separately rank order the boys and girls. From an initial pool of 424, the criterion problem scores (measured in time) of 270 pupils who were randomly assigned within sex and ability categories to the five program treatments were compared in a series of multiple analyses of variance. The scores of the control group caused a significant difference ($p = .01$) for all levels of ability in the comparison of program treatments. These scores were removed from the subsequent comparisons.

Findings about the programming techniques follow:

The performance of the high ability level was independent of any of the variations in program techniques.

Sequencing was significant ($p = .01$) for the middle and low ability level.

Cueing was significant ($p = .01$) for the low ability level.

No significant ($p = .05$) differences were found between the program and the group paced version of the program. (However, the author doubts that this finding would be repeated in typical classroom situations).

Observation: Given a seventh grade learning task, high ability level seventh graders have comparatively little need for program-like sequencing, cueing, and individual response. Conversely, at the lower ability levels, there is a strong need for the full employment of such program techniques. The greatest need is for sequencing. The next most needed technique is for cueing or more detailed guidance.

The above study is based on the research and findings in the Doctoral Dissertation titled: The Use of Non-Verbal Cultural Free Learning Materials in Determining the Value of Sequencing, Cueing, and Individual Response in Programmed Instruction for Three Levels of Learning Ability by Sex submitted to Catholic University in March, 1970.

Abstract No. 13 Chen

VISUAL DISCRIMINATION OF COLOR NORMALS AND COLOR DEFICIENTS

Yih-wen Chen
Assistant Professor and Director of Audiovisual Center
Milwaukee School of Engineering
5219 N. Mohawk Ave.
Milwaukee, Wisconsin 53217

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The effects of hue contrast, illuminant intensity, brightness contrast and viewing distance on the visual ability of color normals and color deficients were studied.

Six each of color normals, deuteranopes and protanopes having approximately equal visual acuity were paid to discriminate the orientation of the gap in chromatic rings presented on chromatic surrounds. Observations were made with monocular vision under a certain level of light adaptation. Subjects' responses were made orally and guessing was encouraged.

The stimuli were made of Munsell color paper. The surround was a circle of 6 mm diameter. The target was a ring with an outside diameter of 6 mm and a thickness of 2 mm and a gap of 2 mm.

In Part I of the study, the amounts of hue contrast were 36^{o}, 72^{o}, 108^{o}, 144^{o} and 180^{o} on the Munsell Hue Circle. The illuminants were approximations of the ICI Source "C" with intensities of 25, 50, 75 and 100 ft.-c. The viewing distance was fixed at 3 m.

In Part II of the study, brightness contrast had four values between 30 and 80 per cent, with a perceptually equal difference between each value. The viewing distances were 5, 6, 7 and 8 m. The illuminant intensity was fixed at 50 ft.-c.

The discrimination accuracy of color normals, deuteranopes and protanopes increased significantly ($p < .01$) as a positive function of hue contrast, illuminant intensity and brightness contrast and decreased significantly as the viewing distance was increased.

When hue contrast was the only cue for discrimination, color normals showed higher discrimination accuracy than deuteranopes and protanopes. However, deuteranopes and protanopes showed discrimination accuracies which were as accurate as those of color normals when the chromatic stimuli contained a brightness contrast of 30 per cent or more between the target and the surround. This result seems to suggest that a brightness contrast of at least 30 percent should be built in colored visual aids so that color deficients would not be handicapped for their defective color visions. This seems true when discrimination of small colored symbols, such as those in maps and electrical circuits, is critical to the learning task.

The data from color normals suggest that a perceptual chromaticity diagram can be constructed for specifying the amount of hue contrast, defined in terms of discrimination accuracy, between any two Munsell hues. A chromaticity diagram as such can be used as a guide for designing visual aids.

Abstract No. 14 Jurgemeyer

THE EFFECT OF COLOR AND GRAPHIC FORM AS STIMULUS FACTORS IN PAIRED-ASSOCIATE LEARNING

Frederick Hans Jurgemeyer
Assistant Professor
Instructional Materials Department
Southern Illinois University
Carbondale, Illinois 62901

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Purpose

The purpose of this study was to determine the effect color and complexity of form have upon the learning of paired-associates. The relationship between paired-associate learning and selected learner characteristics was also treated. This was done in an effort to determine which mode of presentation offered the best opportunity for efficient learning.

Procedure

A paired-associate learning task using a list of ten pairs of pictorial stimulus terms with CCC nonsense syllable response terms was administered to 196 third graders, 224 sixth graders, 142 ninth graders, and 248 twelfth graders. From those tested, 112 subjects were randomly selected from each grade level.

Subjects underwent acquisition trials until they had either given a complete set of correct responses or had completed ten trials. A retention trial was administered three weeks later. The tests were projected on a screen and automatically timed, with each pair shown for eight seconds. Data were gathered on the acquisition trials, the retention trial, achievement levels, grade levels, and sex. Four-way analysis of variance was computed and significant F ratios were followed by Newman-Keuls tests. Differences between modes were also analyzed with t tests.

Findings

1. Significance was achieved between grade levels, achievement levels, and sex on the acquisition trials. Performance increased as grade level increased, high achievers did better than low achievers, and girls did better than boys.
2. Significance was achieved between grade levels and achievement levels on the retention measure, while sex differences were not significant.
3. Interaction of grades and modes was found at the $p = .01$ level. However, no significant differences were found within a single grade level.
4. The interaction of modes and achievement levels was found significant. All high achievement means were significantly different from all low achievement means.
5. No interaction between mode and sex was found.
6. Six comparisons between means of modes were made and none were found significant.

Conclusions

1. None of the modes was significantly better; color and/or complexity did not effect learning.
2. Grade and achievement levels should be considered in the assignment of paired-associate learning tasks.
3. Paired-associate learning is an appropriate learning framework for secondary students, especially high achievers.
4. Females learn paired-associates at a more rapid rate, but differences disappear after a period of three weeks.

Abstract No. 15 Spangenberg

PROCEDURE LEARNING AND DISPLAY MOTION

Ronald W. Spangenberg
Research Scientist
Human Resources Research Organization
Division No. 2
Fort Knox, Kentucky 40121

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The learning effects of display motion in procedure learning tasks were examined in two studies. The task, which was the disassembly of a weapon, consisted of nine clearly separable steps. In the first study, two video tapes, using an identical sound track, were constructed–one using the recorded television camera motion, the other substituting a parallel series of still camera shots. The video tapes provided an introduction to the weapon (including the nomenclature of the parts), an overview of the disassembly, and a step-by-step demonstration with the subject performing each step immediately.

Upon completion of the initial disassembly (cued), a second weapon was provided, and the subjects were asked to repeat the disassembly (uncued). Performance time was recorded for each step in both trials, and for the second (uncued) trial, the number of errors in the order of steps was noted.

The results of the first study showed a superiority of the motion condition. Significantly less time was required to perform the total task in both trials, in four of the nine steps for the first trial, and three of the steps in the second trial. However, an overall ordering effect, as reflected in the number of errors on the second trial, was not shown. The steps showing a motion effect were examined, particularly noting differences in kinds of learner performance errors.

A second study was designed to examine one specific effect on procedure learning, possibly deriving from the motion of the display. Two parallel additional video tapes were constructed in which white cueing arrows indicating the direction of motion were added to the tapes. The original sequence of still camera shots was also modified to provide clearer representations on those steps on which the initial study indicated a superiority of the motion condition. The modified video tape was the one to which arrows were added.

The results of the second study, analyzed using a 2x2 analysis of variance, showed superiority of the motion condition, no effect attributable to cueing arrows, and no interaction. Significantly less time was required to perform the total tasks in both trials, in five of the nine steps for the first trial, and three of the steps in the second trial. In addition, one step showed an inferiority of the motion condition in both trials. Also, as in the first study, an overall ordering effect, as reflected in the number of errors on the second trial, was not shown.

Abstract No. 16 Sommer

THE USE OF SILENT SINGLE CONCEPT LOOP FILMS TO FACILITATE THE ACQUISITION OF OCCUPATIONAL SKILLS

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Seymour A. Sommer
Coadjutant Instructor
Rutgers University
10 Seminary Place
New Brunswick, N.J. 08903

The primary purpose of this study was to discover if the use of silent single concept loop films (SSCLF) could facilitate the acquisition of manipulative occupational skills for nonacademic students. A secondary purpose was to investigate the effect of SSCLF on the teaching-learning climate. Teaching method, involving three levels of use of loop films, was the independent variable. The three films used in the experiment were taken from a series of over 100 single concept loop films made by the researcher.

The experiment involved the introduction of entirely new subject matter for which a pretest was not possible; therefore, the design considered most suitable was the Post-test Only Control Group Design No. 6 as described by Campbell and Stanley (1966). The subjects were a sample of 42 vocational-school-bound eighth and ninth grade students drawn from the population of students in five junior high schools who were low in academic achievement (Mean IQ = $\bar{X}$ = 82.9; Reading Level = $\bar{X}$ = 4.8). The sample was split into three treatment groups: Teacher Only (T_1), Teacher + Film (T_2), and Film Only (T_3); $n = 15$, $n = 12$, and $n = 15$, respectively.

Acquisition of skill was inferred from performance test scores. The same teacher was involved for the Teacher Only and the Teacher + Film treatment groups; the Film Only treatment group was supervised by a graduate student with no previous teaching experience.

Two classes of data were analyzed: (1) student performance on three manipulative occupational skills acquired during timed demonstration-practice periods, and (2) observations by a trained observer from whose data inferences were drawn as to the degree to which the teaching-learning climate was affected by the intervention.

The major findings of the study were: (1) students acquired significantly more skill ($p = .05$) with Teacher + Film than with either of the other two treatments; (2) there was no significant difference in the acquisition of skill between Teacher Only and Film Only treatments; and (3) as measured by student conversation, shop climate tended to be more conducive to the acquisition of skill in the presence of the intervention.

Additional findings of the study were: (1) boys and girls responded similarly to SSCLF; (2) even with SSCLF, subjects who were not motivated in the specific shop area of this study (Commercial Foods & Baking) failed to improve their performance scores; and (3) the use of SSCLF tended to lessen the subjects' need for personal assistance by the teacher.

Among the recommendations the investigator made were: (1) silent single concept loop films should be implemented in baking and commercial foods programs throughout the state, inasmuch as cartridges covering most of the course of study in baking are now available through the New Jersey Vocational Curriculum Laboratory at Rutgers University, The State University of New Jersey; (2) instructional film-making by master teachers in other occupational areas should be encouraged by school administration and supported by the state since it has been demonstrated that a teacher can make effective instructional films; and (3) the feasibility of developing an ongoing Single Concept Instructional Materials Development Program as a function of existing school personnel should be investigated.

Abstract No. 17 Nielsen

PRESENTATION MEDIA AND REPRESENTATION MODES IN INDEPENDENT LEARNING

Thomas G. Nielsen
Director of Media Services
High/Scope Educational Research Foundation
125 N. Huron Street
Ypsilanti, Michigan 48197

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Stanford, Calif.

Problem

The purpose of this study was to investigate, in an independent learning setting with 9- and 11-year-old pupils, the differential effects of (1) iconic and symbolic modes of representing concepts and (2) audio tape and printed booklet (media) versions of filmstrips. An assumption, basic to this study, was that there is a congruence of modes of knowing (intellectual functioning, as articulated by Piaget, Bruner, and others) and modes of representing concepts in media presentations.

Procedures

Four treatments of two filmstrip lessons on concepts of flipcard animation were produced. The verbal component of the symbolic treatments described and explained the filmstrip images and stated the rules and principles of flipcard animation. The verbal component of the iconic treatments directed attention to aspects of the filmstrip images and posed questions about them, but rules and principles were not explicitly stated. The filmstrips for the two lessons were the same for both the symbolic and iconic treatments.

Forty subjects completed the two lessons and testing, individually, in the middle-level learning center of a California elementary school. The test consisted of an assembly and use subtest and two subtests with matching pictorial and verbal test items. Efficiency was estimated by time-to-completion measures for lessons and subtests. The general linear hypothesis was used to estimate interactions of modes, media, and age. A statistical power approach was used to determine the confidence level in retaining null hypotheses when differences were not significant.

Findings

Seven major hypotheses and their corollaries were tested. The hypothesis that the effectiveness of the mode of representation is a function of age was accepted only for the verbal subtest ($p < .05$). The hypothesis that the effectiveness of the medium of presentation is a function of age was not tenable ($p > .10$). A corollary of no significant difference between audio tape and printed booklet media was retained with confidence ($p < .01$).

Conclusions

It was concluded that when a verbal test is the means of measuring performance, the iconic mode of representation appears to be the appropriate mode for 9-year-old pupils, and that the printed booklet medium may be more efficient for presenting the verbal component of filmstrip lessons for both 9- and 11-year-old pupils in independent learning settings.

Abstract No. 18 Tam and Reeve

THE STUDY OF THE IMAGE-ACCUMULATION TECHNIQUE AS A VARIABLE IN MULTIPLE IMAGE COMMUNICATION

As Prepared
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Peter Tim-Kui Tam
Graduate Assistant
Robert H. Reeve
Associate Professor
School of Education
Indiana State University
Terre Haute, Indiana 47809

Purpose

This experiment was designed to study the effectiveness of various techniques or organizing and cumulating images in multiple screen, slide-tape presentations to convey geographical information.

Procedure

The investigators developed stimulus materials which were presented in five different ways (see table on back of this sheet). In treatment I, the slides were projected sequentially on one screen. In treatments II and III, slides were projected cumulatively and regularly on two and three screens respectively. In treatments IV and V, the images were programed on two and three screens respectively. In all treatments, the length, the taped narration, and the sequence of the slides were identical.

A two-part test was developed: part I, to determine the comprehension of the image relationships; part II, the comprehension of the individual pictures and the narration.

After a pilot study, the experiment was conducted with 143 tenth-graders randomized into five groups. It was replicated in another school the following day. A two-way analysis of variance was used for each part of the test and repeated for each school.

Results

No significant differences at the $p = .05$ level were found in (1) the relative effectiveness among the five modes of presentation, (2) the mean scores betwen the males and females and (3) the interaction effects between the sex and the modes of presentation.

Implications

In most cases, the groups that viewed the multi-image presentations had higher scores on part I of the test than those that viewed the single screen presentation. In each school the highest mean scores for part I were from one of the presentations using the programed image accumulation technique. Perhaps the advantages of this mode of presentation would be significant over a longer instructional period, with different age groups, or subject materials.

IMAGE ACCUMULATION TECHNIQUE AS A VARIABLE IN MULTIPLE IMAGE COMMUNICATION

TREATMENT I	TREATMENT II		TREATMENT III			TREATMENT IV		TREATMENT V		
Single Screen	Multiple Image Using Regular Sequence		Multiple Image Using Regular Sequence			Multiple Image Using Programmed Sequence		Multiple Image Using Programmed Sequence		
	Accumulation Technique		Accumulation Technique			Accumulation Technique		Accumulation Technique		
Screen	Screen	Screen	Screen	Screen	Screen	Screen	Screen	Screen	Screen	Screen
(1)	(1)		(1)			(1)		(1)		
(2)	.	(2)	.	(2)		(2)		.	(2)	
3	3	.	.	.	3	.	3	.	.	3
(4)	.	(4)	(4)	.	.	.	(4)	.	.	(4)
(5)	(5)	.	.	(5)	.	.	(5)	.	.	(5)
(6)	.	(6)	.	.	(6)	.	(6)	.	.	(6)
(7)	(7)	.	(7)	.	.	(7)	.	(7)	.	.
(8)	.	(8)	.	(8)	.	(8)	.	.	(8)	.
9	9	.	.	.	9	.	9	.	.	9
10	.	10	10	.	.	.	10	.	.	10
11	11	.	.	11	.	.	11	.	.	11
12	.	12	.	.	12	.	12	.	.	12
13	13	.	13	.	.	.	13	.	.	13
14	.	14	.	14	.	.	14	.	.	14
15	15	.	.	.	15	.	15	.	.	15
16	.	16	16	.	.	.	16	.	.	16
17	17	.	.	17	.	.	17	.	.	17
18	.	18	.	.	18	.	18	.	.	18
(19)	(19)	.	(19)	.	.	(19)	.	(19)	.	.
20	.	20	.	20	.	.	20	.	20	.
21	21	.	.	.	21	.	21	.	.	21
22	.	22	22	.	.	.	22	.	.	22
23	23	.	.	23	.	.	23	.	.	23
(24)	.	(24)	.	.	(24)	(24)	.	(24)	.	.
25	25	.	25	.	.	.	25	.	25	.
26	.	26	.	26	.	.	26	.	.	26
27	27	.	.	.	27	.	27	.	.	27
28	.	28	28	.	.	.	28	.	.	28
29	29	.	.	29	.	.	29	.	.	29
30	.	30	.	.	30	.	30	.	.	30
(31)	(31)	.	(31)	.	.	(31)	.	(31)	.	.
(32)	.	(32)	.	(32)	.	.	(32)	.	(32)	.
(33)	(33)	.	.	.	(33)	(33)	.	.	.	(33)
(34)	.	(34)	(34)	.	.	.	(34)	(34)	.	.
35	35	.	.	35	.	35	.	.	35	.
36	.	36	.	.	36	.	36	.	.	36

. . Accumulation of the image on the same screen - for example: slide (1) in treatment V has accumulated until slide (7) appears.

(○) Indicating Map-Slides. Total number of slides = 36.

Abstract No. 19 Wiley

THE EFFECTS OF VARIOUS RATES OF REVERSE AND SLOW-MOTION PROJECTION ON THE ACQUISITION OF A FILM-MEDIATED PERFORMANCE MOTOR TASK

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Don D. Wiley
Associate Professor of Education
Eastern Washington State College
Department of Education
Cheney, Washington 99004

This experiment involved the effects of three rates of projection and two directions of projection on the acquisition of a complex motor performance task by university students after viewing a demonstration film. Descriptive, theoretical, and experimental literature relating to the nature and processes of learning from film was reviewed.

The purpose of the experiment was to explore hypotheses to the effect that slower rates of projection were more effective than faster rates and that reverse projection was inferior to forward projection when learning a motor task from a demonstration film.

The design was a two by three factorial with thirty subjects per cell. One hundred eighty university students were randomly assigned to one of six treatments in which a demonstration film was shown twice with variations in rate and direction of projection as follows:

Projection Mode	Direction of Projection	
	First Showing	Second Showing
24 frames-per-second, forward	forward	forward
24 frames-per-second, reverse	forward	reverse
12 frames-per-second, forward	forward	forward
12 frames-per-second, reverse	forward	reverse
6 frames-per-second, forward	forward	forward
6 frames-per-second, reverse	forward	reverse

The experimenter developed an original electrical continuity console and task which involved plugging patch cables into five separate circuits to complete the performance task. An expert performer was filmed completing the circuits to provide the demonstration material.

Subjects watched the demonstration film individually and then immediately attempted to complete the electrical circuits. Accuracy of the performance was scored on three factors: sequence, cable orientation, and correctness of jack. Time elapsed in completing the task was recorded for secondary analysis.

An analysis of variance produced F ratios significant for direction of projection, rate of projection at six frames-per-second, and rate of projection at twenty-four frames-per-second. A Duncan New Multiple Range Test provided additional analysis between means. Six frames-per-second proved significantly better than either twenty-four frames-per-second or twelve frames-per-second in forward projection. All forward modes were significantly better than their counterpart in reverse projection. Twelve frames-per-second reverse and six frames-per-second reverse proved significantly better than twenty-four frames-per-second reverse. There was no significant difference between twelve frames-per-second reverse and six frames-per-second reverse.

Projected slow-motion at six frames-per-second forward has profound positive effects on the learning of a demonstrated performance task. Reverse projection has decremental effect at all speeds, but with less severe effect at slower projection speeds.

Abstract No. 20 Short

THE USE OF COMPRESSED SPEECH TAPES IN A MULTIMEDIATED LEARNING LABORATORY

Sarah H. Short
Assistant Professor
304 Slocum Hall
Syracuse University
Syracuse, N.Y. 13210

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Purpose

To alleviate problems arising from a press for space and attempts to individualize instruction, the Department of Nutrition and Food Science at Syracuse University has been offering since 1967 a basic course taught by self-instruction (SI). This includes the use of audio tapes, 8 mm films, slides, pre- and post-tests and computer assisted instruction.

A comparative study (lecture versus SI methods), employing both cognitive and affective testing, indicated that SI was successful in teaching and learning this course. More students must now be fitted into the SI laboratory as more courses are taught by this method. A pilot study was done (Fall, 1970) to investigate the feasibility of using compressed rate speech tapes to progress students through course material in a shorter period and still have comprehension and retention remain high.

Procedure

All students listened to the lecturer's normal speed tapes (approximately 150 wpm) for two months. Then one-third of the class listened to normal speed tapes while one-third listened to four lectures that were compressed 25 percent (ten minutes could be heard in 7½). The remaining third of the students listened to two lectures compressed 25 percent and two lectures compressed 55 percent. The four lectures covered a two week period. Cognitive and affective tests were given before and after the experiment. A further cognitive test was given at the end of the semester.

Results

There was no significant difference among the three groups in achievement post-tests either after one week or after eleven weeks. Learning did take place, since no student passed the pretest while 93% passed the post-test taken one week after the study and 90% passed the post-test taken eleven weeks after the study. Affective testing showed that the students could understand the tapes, and that most students would not like the whole course on speeded tapes but would like parts of the course on compressed tapes.

Implications

Compressed rate speech tapes may be used successfully in a learning laboratory which integrates audio tapes with slides and films. Students who like to use compressed rate speech tapes may progress through the material or review tapes faster and still be able to comprehend and retain the information learned.

Abstract No. 21 George, Lantz, Leturgez, Miller and Phegley

RETENTION OF NON-RELATED SELF-CONTAINED MESSAGES PRESENTED SIMULTANEOUSLY VIA THE AUDIO AND VISUAL CHANNELS

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Robert George
Robert Lantz
Robert Leturgez
Rickey Miller
and Gail Phegley
Instructional Systems Technology
Indiana State University
Terre Haute, Indiana 47809

Problem

This study investigated the following questions:

1. Do self-contained visual messages presented simultaneously with non-related self-contained audio messages have an effect on the comprehension of the audio messages?
2. Do self-contained audio messages presented simultaneously with non-related self-contained visual messages have an effect on the comprehension of visual messages?
3. Do self-contained visual messages presented simultaneously with non-related self-contained audio messages have an effect on the retention of the audio messages?
4. Do self-contained audio messages presented simultaneously with non-related self-contained visual messages have an effect on the retention of the visual messages?

Procedure

Sixty-nine university seniors were presented self-contained non-related audio and visual messages created by the experimenters. Subjects were presented the materials in their classrooms, and then twenty-three subjects' tests were randomly selected for each of the three conditions for statistical analysis. The messages were presented separately for two conditions, and simultaneously for the third. Subjects were tested immediately after the presentation and seven days later.

Results

The first aspect of the study, effect upon *comprehension* of audio or visual messages when non-related messages are received through two different channels simultaneously, was statistically significant at the $p = .01$ level.

The second aspect of the study, effect upon *retention* of audio or visual messages when non-related messages are received through two different channels simultaneously, was statistically significant for the visual message ($p = .05$), but not for the audio message.

Discussion

As might be expected, simultaneous presentation of non-related messages does have an effect upon comprehension of both audio and visual messages, favoring separate presentations.

Also, as might be expected, simultaneous presentation of non-related messages does have an effect upon retention of visual messages. However, the audio retention did not prove to be affected by non-related visual messages.

STANFORD UNIVERSITY

STANFORD, CALIFORNIA 94305

The ERIC Clearinghouse on Educational Media and Technology
The Institute for Communication Research
Cypress Hall
Telephone (415) 321-2300 Ext. 3345

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ERIC at Stanford is pleased once more to be able to cooperate with the AECT Research Committee and Keith A. Hall in making these abstracts available for distribution at the convention.

Such a program fits in well with our aim of making educational information readily available. We hope this is not the sole time that ERIC has provided you with information, and we invite you to let us be of further service to you.

The abstracts are listed on the back of this letter in the order in which the papers are to be presented.

Don H. Coombs
Clearinghouse Director

"ERIC, Stanford, Ca. 94305" is an Adequate Address for Clearinghouse Correspondence

Research Abstracts
for 1972 AECT National Convention

1. Adrian P. Van Mondfrans, Suzanne B. Hiscox, and Greg Gibson, "Response Requirement and Nature of Interpolated Stories in Retroactive Inhibition in Prose"
2. Richard A. Lasco, Merlin M. Mitchell, and L. Cameron Mosher, "The Effect of Pacing of Instruction on the Effectiveness and Efficiency of an Individualized Course Serving College Level Geology"
3. Frank V. Colton, "Effects of 'Time-to-Task' Data on Performance in a College Media Course"
4. Dr. Robert G. George and Miss Karen S. McCarty, "The Effect of Ground Noise in the Auditory Figure-Ground Relationship Upon Word Comprehension"
5. Donald A. Ingli, "Teaching A Basic Audiovisual Course by the Multi-Image Technique"
6. John P. Driscoll, "A Study of Simultaneous Film Learning"
7. Juan P. Cabán, "Eye Movement Preferences as Individual Differences in Learning from Color and Non-Color Pictures"
8. David G. Coffing, "Eye Movement Preferences as Individual Differences in Learning"
9. Dr. Allan J. Abedor, "Development and Empirical Test of a Model for Formative Evaluation of Self-Instructional Multi-Media Learning Systems"
10. Richard F. Lewis, "Attention to Audio-Visual Media—Some Measurement Techniques"
11. David Alan Gilman and Miss Paula Ferry, "Increasing Test Reliability by Means of Adjunct Autoinstruction"
12. Che-tsao Huang, "A Cognitive Approach for Instructional Media Research"
13. Don Gorman, "The Effects of Varying Pictorial Detail and Presentation Strategy on Concept Formation"
14. Clayton J. Vollan, "Effects of Black and White, Authentic and Contrived Color on Children's Perceptions of Dynamic Picture Content"
15. Adrian P. Van Mondfrans, Russell F. Wells, and S. N. Postlethwait, "The Effectiveness of Three Visual Media in Presenting Manipulations of Time, Space and Motion"
16. Jerry M. Linker, "The Interaction of Cognitive Factors, Visual Fidelity, and Learning Tasks in Learning from Pictures"
17. George D. Booth, "The Comparative Effectiveness of Monochrome and Color Presentations in the Facilitation of Affective Learning"
18. Dan Lee Isaacs, Gerald M. Gillmore, and Anne Pettit, "A Comparison of the Pedagogical Value of Black and White Versus Colored Overhead Transparencies"
19. Robert J. Casey, "An Investigation of the Cognitive Effectiveness of Color and Monochrome Educational Materials with Elementary School Children in Relation to the Predominant Home Television Viewing Mode"

Abstract No. 1 Van Mondfrans, Hiscox and Gibson

RESPONSE REQUIREMENT AND NATURE OF INTERPOLATED STORIES IN RETROACTIVE INHIBITION IN PROSE

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Stanford University
Stanford, California 94305

Adrian P. Van Mondfrans
Associate Professor of Educational Psychology
Suzanne B. Hiscox
Research and Development Assistant
Greg Gibson
Undergraduate Research Trainee
360 ARLC
Brigham Young University
Provo, Utah 84601

One of the most popular media used in classroom learning situations is print. Despite the popularity and long history of the print medium, critical questions still exist concerning the most effective conditions for learning when using print. One important question involves the conditions under which retroactive inhibition occurs in printed prose.

Ausubel and others (see Ausubel *et al.*, 1957, 1968) found little evidence of retroactive inhibition in prose. Other investigators (cf., Slamecka, 1960, 1962; Anderson and Myrow, 1971; Crouse, 1971) have. These conflicting results appear to have occurred because of differences in the similarity of the interpolated learning materials, the general nature of the learning materials (general vs. specific; familiar vs. unfamiliar), and the nature of the responses required. In general, it appears from past research that the more specific the learning materials the more similar the interpolated materials are to the original learning materials, and the more difficult the response requirements (e.g., recall is a more difficult response than recognition) the greater the retroactive inhibition. This study further examined the conditions under which retroactive inhibition occurs in prose. The two variables manipulated were the similarity of the interpolated stories (similar vs. dissimilar) and the response requirements (recall vs. recognition).

The *S*s were 190 students enrolled in educational psychology courses at two large universities, a state university in the midwest and a private university in the intermountain west. *S*s were randomly assigned to one of eight treatment groups in a 2x4 factorial design.

Each *S* read the original story which was a brief biography full of facts, and two interpolated stories. The nature of the interpolated stories differed across treatments. In two treatments, the interpolated stories were both similar to the original story. In four treatments the interpolated stories were one similar and one dissimilar in both possible sequences, and for two treatments the interpolated stories were both dissimilar. After reading the three stories, a test was given covering the material contained in the first story. Half the *S*s were tested in a multiple-choice format and the other half in a short answer essay format. The stems of the questions were identical across type of test. The data analyzed were the number correct and the types of errors which were made.

The main effects of the nature of interpolated stories and response requirements were significant when the number correct was analyzed. Two similar stories caused more retroactive inhibition than one similar and one dissimilar story. One similar and one dissimilar story caused more retroactive inhibition than two dissimilar stories ($p < .05$ in all comparisons). In addition, the effect of retroactive inhibition was more pronounced when the response was recall (short answer) rather than recognition ($p < .01$).

Analyses of types of errors showed many significant effects due to the nature of the interpolated stories and response requirements. In general, responses to the short-answer task showed many more omissions (no response) and fewer interjections (responding with an incorrect answer from another story) than responses to the multiple-choice test. Most of the interjections came from the similar interpolated stories.

From the data it is clear that both the similarity of the interpolated tasks to the original story and the response requirements involved affect retroactive inhibition in prose materials. Instructional designers need to be aware of the effects of these variables.

Abstract No. 2 Lasco, Mitchell and Mosher

THE EFFECT OF PACING OF INSTRUCTION ON THE EFFECTIVENESS AND EFFICIENCY OF AN INDIVIDUALIZED COURSE SERVING COLLEGE LEVEL GEOLOGY

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on Media and Technology
Stanford University
Stanford, California 94305

Richard A. Lasco
Acting Chief, Office of Evaluation and Utilization
National Medical Audiovisual Center
1600 Clifton Road, N.E.
Atlanta, Georgia 30333

Merlin M. Mitchell
Research Associate
Division of Instructional Research and Service
Florida State University
Tallahassee, Florida 32304

L. Cameron Mosher
Associate Professor
Department of Geosciences
University of Arizona
Tucson, Arizona 85721

At Florida State University, a course in introductory geology was developed using an audio-tutorial mode of individualized instruction. Purpose of the study: (1) to determine the effect of pacing method on time spent in the course and student achievement, and (2) to compare instruction under the audio-tutorial format with instruction in a more conventional setting.

The study was conducted in two stages. Stage 1 included students in the fall 1970 and winter 1971 quarters. Fall quarter students were directed to work through the nine course units at their own pace, taking unit tests whenever they wished; winter quarter students were externally paced: every week a new unit was introduced and students were required to take a test on that unit within two weeks. Stage 2 included spring quarter students, randomly divided into two groups, one self-paced and one externally paced. Data collected consisted of nine unit test scores, end of course examination scores, time spent by unit and week in the course, and responses on an end of course questionnaire.

Findings in relation to time spent under both pacing procedures in Stage 1 were consistent with those observed in Stage 2. Externally paced students spent a consistent amount of time throughout all weeks of the course, whereas self-paced students tended to decrease the amount of time during the middle weeks and to increase it rapidly toward the end of the course. In Stage 1, self-paced students spent an average of 5.5 hours less in the independent study center than did the externally paced students; in Stage 2, they spent an average of 13.00 hours less. The probable explanation for the greater amount of time spent by self-paced students in Stage 1 than by those in Stage 2 is that the former worked through the materials when the course was first implemented, with inexperienced teaching assistants and untested operating procedures.

In Stage 1, externally paced students tended to show higher unit achievement than self-paced students, but both showed similar end of course achievement. In Stage 2, both groups showed similar achievement on both criteria. The probable explanation for a difference in unit achievement in Stage 1 and not in Stage 2 is changes made in the program between the fall and winter quarters because of the formative evaluation findings. Total unit achievement increased from 89% to 95% to 96% during the three quarters.

Time spent in the audio-tutorial program (Stage 2) was compared with that in previous geology courses taught in a large lecture-laboratory format by the same instructor who individualized this course. A derived estimated time of 103.33 hours was found for the lecture-laboratory course, 71.57 hours for ex-

ternally paced students in the audio-tutorial program, and 59.00 hours for self-paced. End of course achievement of fall 1969-winter 1970 students in the lecture-lab course and those using the audio-tutorial program was also compared. Students using the audio-tutorial format showed significantly higher achievement in five of the six comparisons made. Student attitudes to various aspects of the course (content, instructional materials, audio-tutorial approach, grading, laboratory exercises, multimedia, instructor-student interaction) were overwhelmingly positive.

The findings confirm that achievement is equal under both pacing methods but that time can be significantly decreased through self-pacing procedures. Self-instruction resulted in reduced time and improved achievement over conventional instruction.

Abstract No. 3 Colton

EFFECTS OF "TIME-TO-TASK" DATA ON PERFORMANCE IN A COLLEGE MEDIA COURSE

Frank V. Colton
Assistant Professor
136 Taylor Education Building
College of Education
Department of Curriculum and Instruction
University of Kentucky
Lexington, Kentucky 40506

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The Problem

The study described here focused upon two specific aspects of individualizing instruction in a college media utilization course. First, what are the effects on student performance when the students either know or do not know how much time it has taken others to complete the same tasks? Secondly, of what importance is the concept of "peer tutor" to a student who is attempting to realize his independence as a learner?

Rationale

Gordon (1970) proposed an individualized system characterized as a gradual release of important decisions from the control of the teacher to that of the student. These decisions involve such things as where students should learn, how they should learn, what they want to learn, what can they do when they cannot learn, etc., and finally when or how fast should they be able to learn. The question becomes, how will students react when suddenly given the latitude to make decisions which formerly had not been theirs to make? Correspondingly, what kind of help can be given students who are making these decisions for the first time?

Carroll (1963) has said that *time* is a critical dependent variable in school learning. Because time data were unavailable during the first semester that a restructured college media course was offered, the researcher had the students keep track of the amount of time spent on each task.

In redesigning the media course, the instructor also wished to establish an "open" atmosphere which would allow students to work alone or in small groups. This type of classroom environment lent itself to measuring the importance of the "peer tutor" as suggested by Heathers (1971).

Procedures

Students enrolled in two sections of a media utilization class (N = 47) during the first semester. The individualized format was used and provided pilot data for the study. Students kept records of the time spent doing each objective attempted. The following semester students enrolled in the same course were randomly assigned to one of two sections of the class (N = 46). During the semester as each new component was introduced the average "time-to-task" (average time it had taken students to complete the same tasks the previous semester) was given to students in one section (X_1, N = 29) but not to those in the other section (X_2, N = 17). Students in X_1 who received time-to-task information were simply told they were being provided with information which might serve as a guide for determining how they were utilizing their time. Those in X_2 were told nothing about time-to-task nor did the subject arise.

Results

Significant differences (= .05 level) were found between groups X_1 and X_2 on 6 of 22 tasks whose completion times were compared. A positive correlation (+.87, significant beyond the .001 level) was found between students' scores representing completion of tasks and being named a "peer tutor" by other students.

Conclusions

It is interesting to inspect the nature of the 6 tasks upon which students took significantly more time when they were not given time-to-task input. Five of the six tasks required written application of

rules to solve problems or to create a model. The other task required a combination of cognitive and psychomotor skills to achieve operational competencies with equipment. Conversely, tasks on which significant differences did not occur reflected distinct, structured objectives which required less creative efforts.

When objectives are of a tightly defined nature demanding specific performances it does not appear necessary nor helpful to inform students as to time-to-task. In fact, when time-to-task data are revealed to students attempting objectives requiring higher levels of thinking, performances might be inhibited and cause premature closure by the learner.

Abstract No. 4 George and McCarty

THE EFFECT OF GROUND NOISE IN THE AUDITORY FIGURE-GROUND RELATIONSHIP UPON WORD COMPREHENSION

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on Media and Technology
Stanford University
Stanford, California 94305

Dr. Robert G. George
Coordinator of Instructional Systems Technology
Indiana State University
Department of Education 1180
Terre Haute, Indiana 47809

Miss Karen S. McCarty
Special Education Teacher
Wayne Township School System
1220 South High School Road
Indianapolis, Indiana 46241

Purpose

This study investigated the following questions:

1. Does background noise in the auditory figure-ground relationship have an effect upon word comprehension?
2. Does a learning disability in auditory discrimination have an effect upon word comprehension?
3. Is there an interaction between the two variables?

Procedure

Forty-eight subjects ranging in age from 6 to 12 were selected to stratified random sampling to take the Goldman-Fristoe-Woodcock Test of Auditory Discrimination. Twenty-four of the subjects were drawn from special education groups of learning disability students, and the remaining subjects were drawn from an elementary school. All subjects were from the same school district.

Each subject was tested individually by listening to an audio tape via a headset and responding to the stimulus by pointing to a response frame. The tests were administered by two trained special education teachers.

Results

The first question asked, effect of background noise upon word comprehension, was statistically significant at the .01 level.

The second question asked, effect of auditory learning disability upon word comprehension, was not statistically different at the .05 level.

There was a statistically significant ($p < .05$) interaction between background noise and auditory learning disability.

Conclusion

As would be expected, a high level of noise in the auditory figure-ground relationship effects word comprehension in a negative direction. While the background noise was recorded in a school cafeteria, and all discernible discourse was filtered out, the figure-ground relationship was not unlike other everyday experiences in communication by the subjects. However, since single words were used, it is suggested that there should be further study using simple sentences rather than single words.

The second question concerning auditory learning disability was not statistically significant ($p < .06$), but deserves comment. The authors suspect that the lack of difference between the learning disability subjects and the classroom subjects might be due to previous sessions of taking listening tests of other types on the part of the learning disability subjects.

Finally, the interaction of two variables disclosed that the learning disability subjects scored better on the quiet test, but poorer on the noise test. This suggests that auditory learning disabilities are more critical in the presence of a small figure-ground ratio.

the course was prepared for this technique, a cumulative saving of time could be expected from the preparation of the entire course by this method.

Several items from the opinionnaire responses by experimental students should be mentioned. A high percentage (76.5) of prospective teachers considered the course very worthwhile to worthwhile. A decided majority of the students considered the audiovisuals helpful to the learning situation. Over 50% indicated the belief that more visuals could be used to advantage in the course. Three-fourths of responses indicated this method of teaching I.M. 417 could be taught just as effectively to large sections.

Conclusion

The decided advantage of students from "Other" colleges needs to be carefully studied as does the superiority of females over males. The programming of an entire course by the multi-image method seems indicated to further investigate this teaching-learning technique.

Abstract No. 5 Ingli

TEACHING A BASIC AUDIOVISUAL COURSE BY THE MULTI-IMAGE TECHNIQUE

Donald A. Ingli
Associate Professor
Instructional Materials Department
College of Education
Southern Illinois University
Carbondale, Illinois 62901

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The Problem

Several research studies have investigated the use of the multi-media, or more specifically, multi-images in the teaching of college level courses. There has been a paucity in the reporting of this research and particularly whether this technique resulted in significant differences when compared to classes taught by more traditional methods.

It was the purpose of this pilot study to determine if this technique would be significantly superior to more typical methods of teaching.

Method

Two experimental sections of I.M. 417, *AudioVisual Methods in Education*, were taught in Lawson Hall, a ten auditoria facility with both rear and front screen facilities. Two control classes were taught in a conventional classroom. Two instructors were involved, each teaching experimental and control sections.

Mostly juniors and seniors, 167 students participated in the study. Females numbered 87 and males 80. About one-third of the course units were prepared with additional audiovisuals—films, film clips, slides, overhead transparencies, etc. In experimental classes, often several images were on the screens simultaneously. Only one, however, was discussed at a time. It was believed the media, both print and nonprint, would interact and amplify one another.

Data included pre- and posttests, identical except for arrangement of items. A midterm was also given in addition to asking experimental students to complete an opinionnaire concerning the teaching-learning procedure. Information was processed to determine possible significances based on "t" scores. Variables included (1) instructors, (2) method, (3) sex of students, (4) year in college, (5) colleges of students, (6) academic majors, (7) grade point averages, (8) midterm examination scores, (9) posttests and (10) pretest scores.

Summary of Results

Although only part of the course was prepared with additional audiovisuals correlated with subject matter, an overall significant difference at the .05 level resulted from the experimental method.

No significant difference appeared for combined experimental groups on the pretest nor on the midterm. Instructor A's experimental students, however, were definitely superior to his control class on the midterm. B's control students were significantly better than A's control class on the midterm.

Grade point averages of females were only slightly superior to those of males in the study but on the final data, they did significantly better than the men.

Introduction of the college variable after other results had been obtained caused a re-evaluation of certain outcomes described previously. Significance of the experimental approach over the control method on the posttest was true only for the students from "Other" colleges and departments in the university. However, greatest mean gains from pre- to posttests were in the College of Education. Of the 167 students in the research, 94 were from the College of Education, 31 from the College of Communication and Fine Arts and the remaining 42 from "Other" colleges and departments.

A 15% saving of teaching time resulted from the experimental approach. Considering only part of

Abstract No 6 Driscoll

A STUDY OF SIMULTANEOUS FILM LEARNING

John P. Driscoll
Associate Professor of Education
408 Miller Hall
University of Washington
Seattle, Washington 98105

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An increasing aspect of today's public communication is typified as "multi-media": usually this refers to multiple screen images (perhaps both motion and still) and complex multi-source sound. Do such flamboyant audiovisual techniques hold any real potential for the classroom? Can children actually learn while their attention is divided between such elements, particularly when these are changing rapidly? Do we under- or over-estimate the information processing capacity of today's visually conditioned child?

Objectives

The goal of this study was to investigate factual learning of elementary pupils watching two educational films projected side by side with their respective sound tracks played through stereophonic earphones for each viewer. Comparisons were made with traditional one-film-at-a-time showings and with one film and sound track plus the sound track of another unseen film. Films tested were of the type available in most educational film libraries and included topics in the natural and the social sciences. Pupils were tested by multiple-choice items designed to measure factual learning, with questions balanced as much as possible between information from the visual and audio portions of the films.

Participants

The population studied comprised 30 classes of third and sixth grades in a large suburban school district near Seattle. Classes were assigned randomly (by lot) to the various presentation modes.

Results

The means of third grade classes seeing one film at a time (two-channel) on Film No. 1 was 7.2 out of a ten question test and on Film No. 2 was 6.3. These were significantly higher (with a t score of 1.84 on Film No. 1 and .55 on Film No. 2) than those for classes seeing the same films simultaneously (four-channel), the means of which were both 5.9. Films selected for the sixth grade classes were longer and different from those for the younger children: the test was also modified to twenty items. Means of the sixth grade classes were 13.3 on Film No. 3 and 14.7 on Film No. 4 when presented in the traditional manner versus 12.1 and 13.1 when shown simultaneously.

Three-channel film learning appears to have been less effective than either two- or four-channel, as might be expected. However, third grade classes yielded means of 5.9 and 6.1 on Films No. 1 and No. 2 respectively and sixth grade classes means of 9.3 and 13.4. When one film was seen and the second heard only, the latter was consistently lower by three or four points.

Conclusions

In both third and sixth grades there were differences favoring traditional motion picture representation, i.e. one-film-at-a-time or two-channel communication. There may be, of course, aesthetic and other reasons for such a mode. However, statistically significant differences should not obscure the fact that we are actually speaking of an average differential of only about one question out of ten at the third grade level and one and a half out of twenty at the sixth grade level: thus children seem to have learned somewhat the same amount of material regardless of presentation mode. This suggests we have tended to under-estimate the capacity of children to learn from several inputs simultaneously and perhaps that the educational film format might be changed or intensified in view of this.

Abstract No. 7 Cabán

EYE MOVEMENT PREFERENCES AS INDIVIDUAL DIFFERENCES IN LEARNING FROM COLOR AND NON-COLOR PICTURES

Juan P. Cabán
Assistant Professor
Center for Educational Media and Technology
School of Education
University of Massachusetts
Amherst, Massachusetts 01002

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Purpose of the Study

This study assumed that eye movement analysis would provide the basis for differentiation of subjects in terms of developed preference for color and non-color (black-and-white) picture presentation, and specifically, that results of quantifying eye movements relative to visual intake of information to be learned could be used to predict differential learning success with either color or non-color pictures in a standard paired-associate learning situation.

Procedure

Subjects were 48 fifth and sixth graders from a University experimental school. They were randomly assigned to criteria order of presentation in this repeated measures design setting. All received pre- and post-learning treatments which presented concomitant color and non-color pictures of object pairs and two criterion treatments which presented only color or non-color pictures of object pairs. All visuals were accompanied by an object labeling and relating audio channel. Variable classifications involved in the experiment included ability, personal data, color card preference, eye movement fixation and associating-learning measures.

Results

The experiment demonstrated a significant relationship between eye movement preference and learning success where color vs. non-color visual presentation options were available. Individuals differ in eye movement and color card selection patterns, and these differences provide predictors of learning with alternative visual treatments. The division of the total population into two sub-populations, Groups A and B, on the basis of the subjects' eye fixation preference non-change or change, respectively, from beginning to end of the experiment was seen important as a method of exploring individual differences in learning.

Hypothesis I: That in a synchronous audio visual presentation, learning will be facilitated more by color pictures than by non-color pictures was *not* proven false for the total population and, by exploratory analysis, was empirically supported using sub-populations similar to Group A and Group B. Color pictures were more effective than non-color pictures.

Hypothesis II: That the interaction of presentation mode preferences, as expressed by eye fixation variables, and presentation mode condition on learning scores should be significant was proven false for the total population and by exploratory analysis, was not supported for Group A, but was supported for Group B. A significant Aptitude-Treatment Interaction (ATI) was found between one eye fixation variable and success with the color and non-color picture treatment for Group B.

Hypothesis III: (a) Prediction of learning success will be facilitated by the addition of eye movement variables to more conventional ability predictors; and (b) Prediction of learning success will be facilitated by the addition of color card preference choices to other ability predictors.

Both Hypothesis III (a) and III (b) were *not* proven false for any population grouping.

Ten ATI's were found in terms of color and non-color picture treatments relative to the two sub-population groupings.

The explanation of variance accounted for in the total population and sub-populations in Groups A and B for the color presentation criterion were 41, 59, and 96 percent, respectively, and for non-color presentation criterion were 50, 76, and 99 percent, respectively, with 8 variables included in the stepwise multiple regression formulas.

Abstract No. 8 Coffing

EYE MOVEMENT PREFERENCES AS INDIVIDUAL DIFFERENCES IN LEARNING

David G. Coffing
Associate Professor
School of Education
University of Massachusetts
1010 N. Pleasant Street
Amherst, Massachusetts 01002

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Purpose of the Study

This study assumed that through a history of varying degrees of success and failure with different kinds of visual presentation modes, individuals come to prefer some modes of presentation over others. Given a choice, subjects thus control intake of visual information by directing their eyes more toward the preferred presentation mode areas in a visual display. It was hypothesized that measures of such behavior would be relatively stable and would predict learning under conditions where the subject was presented with the favored presentation mode.

Procedure

A total of 40 children from grades 8 through 12 served as subjects in the experiment. Of these, 22 were white, 10 were black, 4 were Oriental, and 4 were Mexican-American. Random sampling was not applied in the selection of these students, so generalization to a defined population is not clear. Subjects were randomly assigned to one of two treatments which differed only in order of presentation of presentation mode paired-associate criteria. All subjects received pretest and posttest treatments which presented concomitant pictorial and printed word visual projections of object pairs and two criterion treatments which presented pictorial only and printed word only visual projections of object pairs. All visual presentations were accompanied by redundant audio verbalizations. Variables involved in the experiment included ability, demographic, eye movement fixation, and associative learning measures.

Results

Hypothesis I, that in a synchronous audio and visual presentation, learning will be facilitated more by pictorial representation than by printed word representation, was not proven false, $p < .001$.

Hypothesis II, that the interaction of presentation mode preference, as expressed by eye fixation variables, and presentation mode conditions on learning scores will be significant, was not proven false for pictorial, $p < .01$, and was in the predicted direction for printed word, $p < .06$, stimuli. Due to the main effect differences, the significant non-parallel regression slopes, $p < .01$, were ordinal in reference to the aptitude performance range of these subjects.

Hypothesis III, that prediction of learning success will be facilitated by adding eye movement variables to prediction equations based on more conventional ability predictors, was not proven false using correlational and multiple regression analysis. Eye movement variables showed little correlation with either ability or demographic variables, but their addition to multiple prediction equations significantly increased the amount of variance accounted for. Total variance explained was 60 percent for the pictorial criterion and 73 percent for the printed word criterion.

Summary

The experiment demonstrated a significant relationship between eye movement preference and differential learning success where visual presentation mode options were available. Individuals differ in eye movement strategies and these differences provide unique predictors of learning with alternative stimulus materials.

Abstract No. 9 Abedor

DEVELOPMENT AND EMPIRICAL TEST OF A MODEL FOR FORMATIVE EVALUATION OF SELF-INSTRUCTIONAL MULTI-MEDIA LEARNING SYSTEMS

Dr. Allan J. Abedor
Assistant Director, Educational Development Program
447 Administration Building
Michigan State University
East Lansing, Michigan 48823

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Rationale

Available models and techniques for formative evaluation are largely irrelevant for development of instructional systems of greater scope and complexity than simple programed texts. Procedures in such models are either too general for direct application to complex multi-media systems—or, if specific, provide techniques applicable to simple stimulus configurations such as textual programed instruction.

Objectives of the Inquiry

The purpose of this research was to develop and field test a new analog model which prescribed specific procedures for tryout and revision of prototype multi-media self-instructional learning systems.

Methods and/or Techniques

A MK I model was derived from a review of the literature on formative evaluation and assessed by interviewing seven University faculty members who had previously designed and revised five or more multi-media lessons. Interview data showed conclusively that: (1) formative evaluation as practiced by these faculty bore little resemblance to formative evaluation as recommended in the literature; and (2) the procedures in the MK I model were far too time consuming and complex for practitioners to use.

Since the MK I model was of no practical use, a MK II model was developed which appeared capable of generating a large amount of relevant feedback in a very short time. The major innovation in this model was the use of a small group (N = 12) tryout and *debriefing* session as the main method of identifying problems in the prototype and developing effective revisions. The debriefing technique required a group of 9 to 12 students with high, medium and low SAT scores to use the prototype lesson materials and complete a post test and rating scale questionnaire. While students took a "break" a debriefing agenda was developed by noting those items which 30% or more students missed on the post test or indicated concern on the rating scale. The debriefing was then conducted by the lesson author so that students not only identified their specific problems but suggested revisions to solve these problems. Thus, identification of prototype lesson problems and development of revisions became an author/student group responsibility.

Empirical test of the MK II model was conducted in three field experiments involving Michigan State University faculty and students in their courses. The experimental design was the pre-test, post-test control group comparison in which the control groups (N = 12) used the prototype lessons and the experimental groups (N = 12) used the revised versions. *Ss* were randomly selected from pools of volunteers within each lesson author's course. Each field experiment consisted of the lesson author conducting a tryout and debriefing with the control group, revising the lesson, then conducting a tryout and debriefing with the experimental group.

Results

Statistical tests were used to compare four dependent measures: (1) student achievement on the post-test; (2) gain score; (3) percentage of students achieving an 80% criterion; and (4) student attitudes. In two experiments significant differences were obtained ($p > .01$) favoring the revised version on *all four* dependent measures. In the third experiment a significant difference ($p > .05$) favoring the revised version was obtained on the post-test only. It was concluded that in these three experiments the tryout and debriefing model was effective, in that statistically significant differences favoring the revised versions were obtained on nine out of twelve dependent measures in the three separate field trials.

Educational Significance of the Study

The techniques developed in this research provide an operational definition of formative evaluation of complex instructional systems. The techniques enable systematic feedback from students to readily be used as an integral part of the instructional development process thereby improving the efficiency and/or effectiveness of newly developed instructional treatments.

Abstract No. 10 Lewis

ATTENTION TO AUDIO-VISUAL MEDIA– SOME MEASUREMENT TECHNIQUES

Richard F. Lewis
Researcher
Computer Based Project
Prescott School
410 E. Willow Street
Syracuse, New York 13203

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Many variables affect learning from audio-visual media including the characteristics of the stimulus, the history and present condition of the viewer. Several learning theories emphasize the importance of attention as a necessary condition for learning to occur. Unless the viewer attends to the appropriate or specified stimulus, learning will not occur.

Attention has been studied in four major areas of research. The first major area considers attention as an antecedent condition which must be present before an organism can receive stimulation. The antecedent condition may be an orienting response in the direction of the stimulus. The second area deals with attention as a mediating response which directs further action to the stimulus being presented. In the third area, attention is seen as a cognitive or perceptual state in which the organism selects certain stimuli and excludes others. The fourth area of attention considers the relation between a stimulus and a response. Definitions advanced by theorists in this last area are behaviorally defined and consequently easy to monitor.

Researchers involved in discrimination learning experiments have specified operant responses that they call indices of attention. The subject pushes a pedal or operates a telegraph key to produce the stimuli. Studies of vigilance performance have also yielded useful measures of attention. In these experiments, the observer orients towards the display, pushes a button, or fixes his eyes on the display to demonstrate his attention.

The above techniques have recently been applied to measuring attention to television presentations in which the subject pushes a button to illuminate a television screen. Other researchers have described certain behaviors which indicate attention. These include eye movements, verbal behavior and motor activity during an audio-visual presentation.

The discussion evaluates the measurement techniques described above in the following terms: (1) what is being measured, (2) is the technique useful in measuring attention to audio-visual presentations, (3) can a reliable technique of monitoring attention to audio-visual presentations be developed using one or more of the techniques described above.

Abstract No. 11 Gilman and Ferry

INCREASING TEST RELIABILITY BY MEANS OF ADJUNCT AUTOINSTRUCTION

David Alan Gilman
Associate Professor of Education
Miss Paula Ferry
Graduate Assistant
Indiana State University
334 Parsons Hall
Terre Haute, Indiana 47809

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Purpose

The purpose of this study was to compare the test reliability of a test administered and scored as an adjunct autoinstruction exercise with the reliability of the same test scored by the traditional right-wrong procedure.

Rationale

Adjunct autoinstruction, or self scoring tests, was originated by Sidney Pressey in 1926 and several studies have demonstrated the advantages for student learning that occur when tests are administered by adjunct autoinstruction.

Self-scoring tests are forms or devices that allow the student being tested to obtain immediate feedback concerning the correctness of each response by means of symbols revealed to him after he has responded to a test item. The tests are scored by counting the number of responses required to correctly answer all the test items.

Since this scoring method requires students to continue responding to each item until a correct response has been obtained, each item, once answered incorrectly, may be considered as another test item with k-1 of the original k response choices. The result of this apparent increase in test length should increase test reliability over the reliability of the same test scored as one point for correct responses and no points for any item answered incorrectly. Also, since a larger number of responses is required to complete the test, the range and standard deviation of tests scored by self scoring methods are necessarily greater than those of tests scored by right-wrong methods. The greater disperson of scores should also raise the reliability coefficient of a test scored by self-scoring methods.

Procedures

Fifty-four graduate students were administered a 66 item four-response multiple choice test on self-scoring test forms. Each test was scored by the self-scoring method of counting the number of responses necessary to correctly answer all items. A right-wrong score was obtained by each item answered correctly on the first response as one point and counting all items not answered correctly on the first response as zero points. An odd-even correlation coefficient was computed and then corrected by the Spearman-Brown prophecy formula to obtain the split-halves reliability coefficient for both methods of scoring the test. The mean, standard deviation, and reliability coefficients were compared for the two methods of scoring. Differences in odd-even correlation coefficients and split halves reliability coefficients were analyzed to determine if significant differences existed between the values for the two scoring methods.

Results

The mean, standard deviation, odd-even item correlation, and split halves reliability coefficient were all substantially higher when the tests were scored by self-scoring methods rather than by right-wrong methods. For the odd-even item correlation, the test statistic obtained was 3.87, with a significance level of .00004. The test statistic obtained for the test of significance of differences between reliability coefficients was 4.13, with a significance level of .00003.

Conclusions

The results of the study clearly demonstrate that it is possible to increase the reliability coefficient of a test by administering it and scoring it by self scoring methods rather than by right-wrong scoring

methods. The higher reliability coefficient obtained by self-scoring may be due to the apparent lengthening of the test, a larger standard deviation, or the partial credit students receive when they do not respond correctly to items on the first response. It is also possible that the higher reliability may be due to a combination of these factors, or that some of these factors may be concomitant of the others.

Regardless of the source of reliability index increment, this study has demonstrated that it is possible to increase the reliability index of a test by administering it by self-scoring methods rather than by the traditional right-wrong method. Further research could possibly determine how to predict the magnitude of the increase in reliability that results from self-scoring methods.

Abstract No. 12 Huang

A COGNITIVE APPROACH FOR INSTRUCTIONAL MEDIA RESEARCH

Che-tsao Huang
Assistant Professor
York College of The City University of New York
150-14 Jamaica Avenue
Jamaica, New York 11432

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Two trends can be noted in the history of instructional media research: (a) emphasis on the terminal performance and (b) lack of experimental attention in the cognitive processes. The terminal performance is usually measured by the mean number of trials to criterion or the mean number of errors, or both, and the cognitive processes include, among others, such cognitive activities as strategies, hypotheses or plans used by *S* in the course of learning. While emphasizing the terminal performance, instructional media research has generally given little attention to trace cognitive strategies employed. Possibly the lack of research attention has reflected the lack of research techniques by which the cognitive strategies may be investigated. The purpose of this paper is to consider a possible approach.

The most commonly used technique for studying the cognitive strategies has been *S*'s verbal report on what went on in his mind. This technique has at least one shortcoming: the possibility of *S*'s inability to vocalize what actually went on in his mind. To remedy this difficulty, psychologists have developed what is called the blank trial technique as an alternative approach for the investigation of the cognitive processes in general. The blank trial technique refers to an experimental method which interpolates non-feedback trials between feedback trials. The non-feedback trials are called the blank trials from which strategies utilized by *S* may be inferred. The blank trial technique has, since its development in 1963, been widely used by psychologists to investigate the cognitive processes of learning. However, its use by instructional media researchers who, like psychologists, are also concerned themselves with learning has not yet been reported. This paper discusses its possible implication for instructional media research.

An experiment using the blank trial technique to identify strategies employed by *S*s in the course of solving concept problems is used as an example in this paper to demonstrate how it might be used to investigate the cognitive processes. In this experiment, feedback was given to *S* at every third trial, that is, first, fourth, seventh, tenth, etc. During the remaining trials, he received no feedback. A total of 72 graduate students were asked to serve as *S*s and were tested individually. Stimulus materials were made on 2x2 Kodak Ektachrome slides and were presented for them by an electronically controlled display box. Their tasks were to solve three visually presented double-element conjunctive concepts.

According to the response patterns on the blank trials and a set of pre-established rules, *S*s were identified as using various strategies in the course of solving the concept problems presented. The strategies identified were the conservative focusing strategy, the focus gambling strategy, the ambiguous strategy, the successive scanning strategy, the multiple strategy, and the start over strategy.

It should be pointed out that this paper does not attempt to exhaust type of strategies used by *S* in the course of learning. What seems to be significant to instructional media research is that it is possible to use the blank trial technique to trace strategies. It is hoped that in so doing, instructional media researchers will learn something further about cognitive processes in general.

Abstract No. 13 Gorman

THE EFFECTS OF VARYING PICTORIAL DETAIL AND PRESENTATION STRATEGY ON CONCEPT FORMATION

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Don Gorman
Assistant Professor
Florida Atlantic University
College of Education
Boca Raton, Florida 33432

The purpose of this study was to determine the effects of varying pictorial detail and presentation strategy on learners of varying levels in a visually transmitted concept formation task. Specifically, line drawings containing only relevant detail and halftones containing relevant and irrelevant detail were presented successively and simultaneously to three separate populations of fifth grade, ninth grade and fifteenth grade subjects.

A randomized post-test only control group experimental design was employed in a school related concept formation task. Two meaningful architectural concepts--squinch and mastaba--having an unequal number of criterial attributes were used with a fixed number of trials strategy. Two 3x3x2 factorial analysis of variance were employed to process the data from the 120 subjects involved.

A lack of practical differences in performance was found as it related to the amount of detail, presentation strategy and grade level when a fixed number of trials strategy was employed in a school related concept formation task. The resulting similar effects across grade levels suggest that a common line drawing-halftone format and presentation strategy can be used with equal effectiveness with a wide range of the present student population from the fifth grade to the fifteenth grade. The lack of differences between the line drawing-halftone format suggests that a "tolerance" level exists for some irrelevant detail in a picture without a decrease in performance. The "tolerance" level suggests that the increased realism can be processed without compromising the advantages of simplification. In addition there may be an important relationship between the complexity of a task and the effects that varying amounts of detail have on a given presentation strategy.

Abstract No. 14 Vollan

EFFECTS OF BLACK AND WHITE, AUTHENTIC AND CONTRIVED COLOR ON CHILDREN'S PERCEPTIONS OF DYNAMIC PICTURE CONTENT

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Stanford, California 94305

Clayton J. Vollan
Assistant Professor
Educational Communications
University of Hawaii
1776 University Avenue, Wist 105
Honolulu, Hawaii 96822

This study was undertaken to provide additional empirical evidence to assist those designing still pictures to be used in the teaching-learning process. Previous research indicates that when shown a selection of pictures ranging from simplified drawings through realistic photographs the majority of *Ss* prefer more realistic pictures over less realistic. In the past, little connection could be found between such preference and increased learning, unless realistic details were necessary for showing the critical attributes of the object under study. Travers (1969), while gathering information on how *Ss* accumulate information while viewing still pictures, found that *Ss* viewing pictures appearing in full color made significantly more reports of dynamic picture content (implied motion) than *Ss* viewing pictures appearing in less realistic forms.

This thesis study investigated (1) whether Travers' findings would be found with a larger sample and a somewhat different procedure, and (2) whether, as Travers contended, the greater frequency of such reports is the result of the realistic nature of full-color pictures or simply the result of color being present.

A sample of 90 sixth grade students who were randomly assigned to three intact classes of 30 each were shown still pictures produced in three versions: black and white, authentic color, and contrived (unrealistic) color. Half of the pictures shown were of static situations and were included to minimize the biasing of results had pictures with dynamic content been used exclusively. The remaining half of the pictures showed dynamic situations. *Ss* were asked to describe "what they saw" in writing after each picture was projected tachistoscopically for approximately one-half second. Responses were analyzed and scored as reporting either a dynamic or a non-dynamic picture content. Confounding of specific picture content and the production version variable under study (black and white, authentic color or contrived color) was controlled by the use of a fractional factorial design with repeated measures.

Analysis of variance for a fractional factorial design yielded a significant F ratio for differences among production versions. Pair-wise comparison of production version means was conducted using Tukey's HSD (honestly significant difference) test to determine the source and significance of the difference found between means. All production version means were found to be significantly different at the .01 level. The mean for authentic color was found to be significantly greater than the mean for black and white. The mean for black and white was found to be significantly greater than the mean for contrived color.

This study found that *Ss* viewing still pictures appearing in authentic color reported dynamic picture content with significantly greater frequency than *Ss* viewing still pictures appearing in black and white or in contrived color. Pictures appearing in black and white, although inferior to pictures appearing in authentic color, were responsible for a greater frequency of reports of dynamic picture content than pictures appearing in contrived color.

More frequent reporting of dynamic picture content by *Ss* when viewing pictures appearing in authentic color can be associated with the realistic nature of the color used. Thus this study provides further evidence of the value of realistic pictures in teaching-learning activities.

Abstract No. 15 Van Mondfrans, Wells and Postlethwait

THE EFFECTIVENESS OF THREE VISUAL MEDIA IN PRESENTING MANIPULATIONS OF TIME, SPACE AND MOTION

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Stanford, California 94305

Adrian P. Van Mondfrans
Associate Professor of Educational Psychology
360 ARLC
Brigham Young University
Provo, Utah 84601

Russell F. Wells
Assistant Professor
St. Lawrence Univeristy
Canton, New York 13617

S. N. Postlethwait
Professor of Botany
Life Science Building
Purdue University
Lafayette, Indiana 47907

This study examined the effectiveness of three visual media- slides, motion pictures, and sequential still photographs–in presenting learning materials involving manipulations of time, space, and motion. All three presentations made were developed from the motion picture stock, thereby insuring that all *Ss* would view materials containing the same objective information.

The visual learning materials were presented in an introductory biology course taught in the audio-tutorial system format. *Ss* were randomly assigned to one of six groups which were then randomly assigned to one of the three presentation modes in a timed or non-timed format. *Ss* viewed biological phenomena involving manipulation of time, space and motion by a different presentation mode. The biological phenomena utilized in the learning materials were an integral part of the *Ss*' course work. Objectives tests of 15 items each were administered upon completion of the experimental study materials.

The test scores were analyzed in a 3x2 factorial analysis of variance. The main effects were mode of presentation (motion pictures, slides, and sequential still photographs) and study format (timed or non-timed). Only one significant effect due to study format was found. It could be explained as an artifact of the experimental situation. This variable--study format–will not be discussed further in this abstract. The data from each of the three tests (one each for manipulations involving time, space, and motion), were analyzed separately and also combined for an analysis of the overall effectiveness of the three media.

The analysis of test scores involving manipulation of time showed that the mean score for *Ss* in the motion picture treatment was significantly higher ($F(2,174) = 3.70, p < .05$) than that for *Ss* in the other two treatments, which were not significantly different from each other. The analysis of test scores involving the manipulation of space showed no significant differences due to presentation mode ($F(2,198) = 2.95$, $f = 3.05$ needed at the .05 level). The means for the sequential still photographs and slide treatments were higher than the mean for the motion picture treatment.

The analysis of test scores involving manipulations of motion showed a significant effect for presentation mode ($F(2,204) = 3.64, p < .05$) with the means for the motion picture slide treatments significantly higher than the mean for the sequential still photograph treatment. The motion picture and slide treatments did not differ significantly. When the test scores for all three types of concepts were pooled, no significant differences were found.

The discussion of these results would necessarily be lengthy in order to be sufficient. In general, the observation that the relative effectiveness of a visual medium is affected by the critical attributes of the concepts being presented suggests the need for a more careful matching of presentation conditions and the materials being presented for improved learning.

Abstract No. 16 Linker

THE INTERACTION OF COGNITIVE FACTORS, VISUAL FIDELITY, AND LEARNING TASKS IN LEARNING FROM PICTURES

Jerry M. Linker
Resource Consultant
Eastfield College
3737 Motley Drive
Mesquite, Texas 75149

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The effect upon level of performance of interactions between three cognitive factors, visual fidelity, and three learning tasks was investigated. The potential importance of interaction effects has been suggested by recent studies of aptitude-treatment interactions; however, other studies produced results which left the question of the effects of interactions open.

The sample for the study consisted of 210 volunteers from classes in the Department of Curriculum and Instruction. The sample tended to be young (mode = 21 years) and female (72 percent). Each subject completed three measures of cognitive factors: the *Hidden Patterns, Gestalt Completion,* and *Surface Development* tests. These tests measured flexibility of closure, speed of closure, and visualization, respectively.

The experimental materials consisted of 2x2 inch slide series designed to instruct the subjects in performance of knowledge, translation, and extrapolation tasks. Each series was produced in three versions: full color, normal black and white, and extreme contrast black and white, representing different levels of visual fidelity. Individual subjects were randomly assigned to treatment groups. Uniformity of experimental procedure was accomplished by means of tape recorded instructions and electronic synchronization of the projection equipment. Performance of the three learning tasks was measured by experimenter developed criterion tests.

Performance scores on the criterion tests were used as the dependent variable in four separate factorial analyses. The results of these analyses revealed that when performance was averaged across aptitude levels and learning tasks, visual fidelity had a significant effect upon performance. When performance was averaged across learning tasks and treatment levels, each of the three cognitive factors had a significant effect upon performance. When performance was analyzed separately for learning tasks, treatment levels, and levels of cognitive factors, a significant portion of the variance was produced by interaction effects. Significant interactions were found between: learning tasks and flexibility of closure, learning tasks and visual fidelity, speed of closure and visual fidelity, learning tasks and visualization.

The importance of the different types of interactions found are discussed and recommendations for future research are made.

Abstract No. 17 Booth

THE COMPARATIVE EFFECTIVENESS OF MONOCHROME AND COLOR PRESENTATIONS IN THE FACILITATION OF AFFECTIVE LEARNING

George D. Booth
Instructor/Assistant Director, EPDA Media Institute
School of Education, WPH 801
University of Southern California
University Park, Los Angeles, California 90007

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Procedure

From the random selection of two color motion picture films, a group of twenty items to measure affect were formulated and submitted to a jury of teachers and graduate students for approval. In the next phase, pupils who were typical to a suburban community were surveyed to determine the prevailing type of viewing mode in their home (color or monochrome). On the basis of this information, pupils were randomly assigned to view at school identical material by means of either color motion picture film or a monochrome video tape made from the film. At the end of each of the two presentations the items measuring affect were submitted to pupils for their response. These responses were then analyzed for statistical significance with respect to home viewing mode and the experimental school presentation mode. Two field trials preceded the main experiment to assist in validation of the experimental procedures.

Treatment of Data

A two by two factorial design was replicated at the second, fourth and sixth grade levels. Test items were individually inspected by cell, and 60 analyses of variance were computed by Biomedical Computer Program 02V. Additionally, grand means, as reported by grade level, were used to assess possible positive or negative attitudes toward the test items.

Selected Findings

Twenty-three instances of statistically significant relationship at the .10 (or better) level of confidence were generated. Pupils in the second grade who saw the monochrome presentations were more positive toward three items which called for use of qualities of imagination. Pupils in grade two who saw the color presentations were significantly more positive toward two items which implied some commitment to action.

At the fourth grade, examination for interaction disclosed two instances wherein pupils were more positive about an action if the viewing mode was the same as that which existed in their home.

Pupils in the sixth grade who saw the color presentations were more positive toward items concerned with valuing (two instances), as well as two situations showing a preference for a mode different from that at home.

Selected Conclusions

An assumption that prior years of monochrome viewing would work to the detriment of color viewing in the matter of affective learning was unsupported.

Pupils in grade four appear to be in a transitional state and the statistical and observational data resulting from this investigation support no definite conclusions or explanations.

Pupils in grade two showed, in a greater number of instances, a stronger tendency toward internalization of positive attitudes when viewing monochrome presentations.

The color variable may be a positive factor in promoting levels of valuing in grade six.

Abstract No. 18 Isaacs, Gillmore and Pettit

A COMPARISON OF THE PEDAGOGICAL VALUE OF BLACK AND WHITE VERSUS COLORED OVERHEAD TRANSPARENCIES

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Dan Lee Isaacs
Head, Instructional Materials Division and
Assistant Professor of Educ. Psychology
405 Engineering Hall
Gerald M. Gillmore
Assistant Professor, Department of Psychology and
Office of Instructional Resources
307 Engineering Hall
Anne Pettit
Assistant Professor, Physical Education for Women
117 Freer Gymnasium
University of Illinois
Urbana, Illinois 61801

There has long been debate as to whether colored instructional materials are more effective in a classroom than black and white materials. Though many experiments concerning color indicate no difference, there is the practical consideration that many classroom teachers do not feel that laboratory studies have any relevance for their classrooms. The higher cost of producing colored instructional materials is also a very practical consideration. A study was thus designed to compare the pedagogical value of black and white versus colored overhead transparencies to be used with a Physical Education course entitled "Fundamentals of Human Movement." This particular course lent itself well to this study because it was necessary for students in the course to learn to differentiate movement of various parts of the body, and the colored clothes more nearly represented the real life situation.

Two sets of about 40 overhead transparencies were produced. Each transparency depicted children of varying ages performing a physical task such as running or jumping. One set of materials (Set A) showed the outline of the children in black, with their clothes blocked in with one or two colors. In the second set (Set B), these areas appeared clear. This was the only difference between the two sets.

Three instructors were scheduled to teach four sections of the same course. Their course objectives were identical, and all placed strong emphasis on the use of overhead transparencies. One instructor taught two sections using transparencies from Set A for one section and Set B for the other. The section that received Set A was determined by random selection. One of the other instructors, chosen randomly, used Set A, the other used Set B. There were 90 students enrolled in the four sections.

For the purpose of this study seven 30-second black and white film clips were produced and used as a post-instruction classroom examination. Each film clip showed a child performing a different skill. After viewing each sequence four times the students were given a list of errors from which they were to select three which had been exhibited in the film clip. It was felt that these film clips provided all with identical test situations which realistically approximated situations a student might encounter outside the classroom.

In order to assess the attitudes of students toward the use of transparencies and toward what they had learned in the course, an eleven item Likert-type attitude questionnaire was constructed.

The reliability of the examination as a whole was only .099. (This represents an average inter-item correlation of less than .02!) Since the validity of any test is limited by its reliability, the obvious conclusion is that this test was not valid as a measuring device for the purposes of this study. As a result, no valid comparison in terms of learning could be made between the students exposed to colored transparencies and those exposed to black and white ones.

The attitudes of the two groups of students toward their learning and toward the transparencies were compared using *t* tests. Two items showed significant differences. The students using colored transparencies had a significantly more positive attitude toward greater use of transparencies in the course and a stronger preference for colored transparencies.

Abstract No. 19 Casey

AN INVESTIGATION OF THE COGNITIVE EFFECTIVENESS OF COLOR AND MONOCHROME EDUCATIONAL MATERIALS WITH ELEMENTARY SCHOOL CHILDREN IN RELATION TO THE PREDOMINANT HOME TELEVISION VIEWING MODE

Robert J. Casey
Assistant Professor
University of Southern California
School of Education WPH 801
University Park, Los Angeles, California 90007

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This study investigated the general effects of color in the cognitive learning of children in the second, fourth and sixth grades and the influence on this learning from the home television viewing practices.

Color educational films were chosen randomly from a large film library and were transferred to monochrome video tape. The color film was projected for viewing by one group of subjects made up partly of those who watched color television at home and partly those who watched monochrome at home. Simultaneously another group made up of the same two types of subjects watched the monochrome video tape of the same films.

Immediately after each presentation, all subjects responded to the same true-false test administered by audio tape.

Treatment of Data

Tests were scored on a right minus wrong basis. A two by two factorial design was replicated at the three levels. Analysis of variance and the F statistic were computed by Biomedical Computer Program 02V. Tests were made on the total score and additional tests were made on subgroups of questions. The subgroups were: questions pertaining to each film, questions rated above two by Bloom's taxonomy and questions connected to the audio track.

Findings

It was found that second grade children learned significantly more from the black and white presentation on all areas measured except when no information was presented on the sound track. When there was no narrative sound track, second graders learned about the same from both color and black and white.

Fourth grade subjects learned significantly more when the school presentation was made in the same mode as they commonly watch at home.

Sixth grade subjects learned significantly more from the color presentation regardless of the predominant home viewing mode.

Discussion

The findings suggested that color may operate as noise to the very young learner. The findings also suggest that as color becomes more frequent in the home it may become a greater factor in learning in older children.

STANFORD UNIVERSITY
STANFORD, CALIFORNIA 94305

The ERIC Clearinghouse on Educational Media and Technology
Stanford Center for Research and Development in Teaching
Telephone (415) 321-2300 Ext. 3345

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ERIC AT STANFORD is pleased once more to be able to cooperate with the AECT Research Committee and Keith A. Hall in making available these abstracts for distribution at the AECT Annual Convention.

We hope that we can be of other service to you as well. If you are not familiar with ERIC (EDUCATIONAL RESOURCES INFORMATION CENTER), please take the time to read through our brochure.

The research abstracts are listed on the back of this letter in the order in which the papers are to be presented.

Richard E. Clark
Clearinghouse Director

Research Abstracts
for 1973 AECT National Convention

1. David C. Butler, Clarence Eric Ott, and Rowland S. Blake, "Cognitive Scaffolding in the Learning of Foreign Language Vocabulary: An Experimental Study"
2. Lee J. Mullally, "Comprehension of a Narrative Passage by Primary School Children as a Function of Listening Rate and Reading Comprehension Level"
3. Eugene H. Aist and Vernon S. Gerlach, "The Effect of Visual Prompting on Learning"
4. Joseph J. Stowitschek, "Validation of Minicourse Five for Special Education"
5. Dawn Skailand, "Teacher Education Through Minicourse 18: Teaching Reading as Decoding"
6. Thomas G. Nielsen and John P. Moore, "Media Presentation and Concept Representations Variables in Independent Learning"
7. Jacques LaPointe, "Iconic and Symbolic Representation Modes Through Media Presentations in an Independent Learning Situation"
8. John Anastasio, "Photograph Sequencing as a Method of Evaluating the Knowledge and Conceptualizations Gained from a Film by Primary and Intermediate Educable Mentally Retarded Children"
9. Paul A. Scholl, "A Pilot Study to Test the Effect of Visual Stimulus Presentation Strategies on Learning a Motor Skill"
10. Robin Edgar Lawrason, "The Effect of the Sequence of Instructional Events in a Concept Learning Task in Film Study"
11. David A. Jacobsen and Vernon S. Gerlach, "A Comparison of the Effects of Textual and Televised Modes of Instruction in Teacher Education"
12. H. Kenton Reavis and Devoe Rickert, "Teaching Packages for Parents"
13. Richard C. Boutwell, William C. Low and John Hughes, "Imagery Directions and Relevant Drawing in a Prose Learning Task"
14. Patrick E. Smith, Kenneth C. Roberts and Curtis L. Taylor, "The Use of Inferred Objectives with Instructional Films"
15. Vernon S. Gerlach and Fritz H. Brecke, "Algorithms in Teaching and Learning—A Theoretical Statement"
16. K. Anthony Edwards and Richard B. Powers, "Self-Pacing in a Personalized System of Instruction: Work Patterns and Course Completion"
17. Jimmie R. Simmons, "Extra-Communication Variables in the Acquisition of International Orientations Among Adolescents"
18. Magnus Haavelsrud, "Perceptions of Source Utility in the Formation of International Orientations Among Secondary School Students in Norway"
19. Gary L. Hull, "A Comparative Study of Selected Ethnic Characteristics of Information Sources and Their Influence on the Receiver"
20. Gary O. Coldevin, "Educational Communications and the Formulation of National and International Orientations"

COGNITIVE SCAFFOLDING IN THE LEARNING OF FOREIGN LANGUAGE VOCABULARY: AN EXPERIMENTAL STUDY

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David C. Butler
Research Associate
Clarence Eric Ott
Research Associate
Rowland S. Blake
Research Associate
360 ARLC
Brigham Young University
Provo, Utah 84601

Many studies demonstrate the effectiveness of mental elaboration, mediators, and mnemonics and their superiority over rote rehearsal conditions in verbal memorization tasks (G. H. Bower, 1970; B. R. Bugelski, 1968; W. D. Rohwer, 1966).

According to W. D. Rohwer (1973), the critical determinant of performance in verbal associative learning is whether the student generates a mental event which can serve as a common referent for the members of the pair to be learned. We would then expect an effective mnemonic device in learning foreign vocabulary to be some mental event created by the student which involves both sound of the foreign expression and its meaning. For example, a student might remember that Spanish *abarrotar* means "to overcrowd" by visualizing *a bar o' tar* (overcrowded because many are stuck to it), or that German *Mass* means "measure" by visualizing *a yardstick covered with moss.* This kind of mnemonic device serves as a kind of cognitive scaffolding which supports the erection of the new mental structure required to link the two members of the pair (sound-meaning) in a meaningful manner.

This experiment was designed to answer the following specific questions: (1) Is a learning strategy based on the use of visual mnemonics more effective than an unadorned rehearsal technique for learning FL vocabulary? (2) Will providing the student with a specific visual mnemonic for each word be more effective than having him invent his own?

The task of the experiment was to learn the meaning of 24 German words presented at 12 second intervals. Subjects were randomly assigned to one of four experimental groups: Group A, mnemonic provided; Group B, mnemonic invented by student; Group C, student used any method desired; Group D, repetition control. Subjects were then tested immediately and again after an intervening interference task by having them write the English meaning as they heard the German word on the tape at 12 second intervals.

On test 1, Groups A, B, and C were all superior to Group D ($p < .01$). On test 2, Group C performed significantly better than A and D ($p < .01$) and B was superior to D ($p < .05$). Other differences were not significant.

By comparing Groups A and B with Group D, it can be concluded that a learning strategy based on the use of visual mnemonics is superior to an unadorned repetition technique, at least when students formed their own mnemonics of this type.

The comparison of Groups A and B showed a tendency in favor of instructing students how to form their own mnemonics rather than providing them with one.

Using the students' self reports of the method they actually used to remember each of the 24 German words, and the data on correct items, the percentage of correct answers by different methods was calculated. For all groups, methods involving verbal or visual mnemonics were considerably more effective than a repetition technique. This was true even in Group D, which was specifically instructed to use an unadorned repetition technique.

Abstract No. 2 Mullally

COMPREHENSION OF A NARRATIVE PASSAGE BY PRIMARY SCHOOL CHILDREN AS A FUNCTION OF LISTENING RATE AND READING COMPREHENSION LEVEL

Dr. Lee J. Mullally
Assistant Professor of Secondary Education
Kent State University
Kent, Ohio 44242

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Purpose

The purpose of this research was to examine the difference in listening comprehension for primary grade children who listened to a narrative passage compressed at four different word rates. Reading comprehension achievement level was also evaluated in order to determine if it could be used as a predictor variable for the comprehension of compressed speech.

Rationale

Listening, as a mode of learning, has been considered to be an inefficient method of learning because individuals assimilate information at a much faster rate. Data are needed to determine the effectiveness of auditory learning through varying word rates, especially for those at the primary grade level.

Procedures

A sample population of 96 primary grade subjects were randomly assigned to the twelve treatment groups according to their reading comprehension achievement levels. The subjects were classified according to low, middle, and high reading achievement abilities based upon the grade equivalency scores for the reading section of the Stanford Achievement Test; and the four levels of word rate, 0, 20, 40, and 60 percent compression.

The eight subjects within each of the twelve treatment groups listened to a set of directions and the narrative passage recorded on audio tape. The directions were divided into three parts with the second part serving as a familiarization passage. The familiarization passage was compressed the same amount of time as was the narrative passage to which the subject was to listen.

The story of Johnny Appleseed served as the narrative passage for the study and was originally recorded at 138 words per minute. In addition to the 0 percent compression word rate, the passage was compressed to 173, 230, and 345 wpm using the sampling method at the Perceptual Alternatives Laboratory, University of Louisville, Kentucky. The story of Johnny Appleseed was selected because of its favorable rating on the Flesch Readability Index. After listening to the narrative passage, the subjects were given a comprehension test.

A two-way analysis of variance was employed in order to determine the main effect of word rate and reading achievement level. An interaction effect between the two factors was also tested. The .05 level of confidence was used to test the three major hypotheses for significance.

Results

The analysis of the data concerning the comprehension scores of the narrative passage provided the following results:

1. Listening comprehension of a narrative passage declined as the speech was compressed or the listening rate increased. The amount of decline from 0 to 20 percent compression was evident but to a much lesser degree than the decline from 20 percent and above. The decline in comprehension noticeably began at the 40 percent level of comprehension and continued to drop drastically at the 60 percent level of compression.

2. Individuals reading at a third grade reading achievement level scored higher in a listening comprehension test for a narrative passage than students at a second grade reading achievement level. The students at the second grade reading achievement level scored higher in a listening comprehension test for a narrative passage than students at the first grade reading achievement level.
3. The null hypothesis for interaction between the three levels of reading achievement and the four levels of word rate as determined by the listening comprehension test scores for the narrative passage was not rejected.

Conclusions

Children at the higher reading achievement levels scored higher on listening comprehension test than did those at lower reading achievement levels, indicating that a relationship between reading and listening does exist. Listening comprehension does decline for those levels of greatest compression which is similar to the research involving older subjects.

THE EFFECT OF VISUAL PROMPTING ON LEARNING

Eugene H. Aist, Ed.D.
Assistant Professor of Audiovisual Education
Central Missouri State University
Warrensburg, Missouri 64093

Vernon S. Gerlach, Ed.D.
Professor of Educational Technology
Arizona State University
Tempe, Arizona 85281

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Purpose

This study was conducted in order to learn whether a pattern of visual prompting which used different prompting stimuli on all trials of an instructional sequence would produce a different degree of learner achievement than one in which the identical prompting stimulus was used on all trials of the instructional sequence.

Rationale

Literature on prompting is replete with studies in which an *identical* prompting agent is used on all stimulus-response trials. Extending the work of researchers such as Trabasso (1963), Norman and Rieber (1968), Taber and Glaser (1962) and Hershberger (1964), this study was designed to investigate the effects of a pattern of visual prompting which would provide the necessary stimulus support and at the same time not produce a level of dependence which would have a detrimental effect on achievement.

Procedures

To determine whether such prompting was possible, an instructional product was designed, validated, and produced which depended heavily upon the use of extraneous prompting agents to teach junior high school industrial arts students to identify ten electronic symbols. The study consisted of a control group and four treatment groups, two of which received instruction using different prompting agents on successive S-R trials and two groups which received instruction in which the prompting agents remained the same for all trials. One of the groups prompted by each pattern had the prompting agents removed gradually, by fading; the prompting agents for the second group were removed suddenly, by withdrawal. The control group received the same treatment, without any visual prompting. An achievement test was constructed and validated. Data obtained from the administration of the test were analyzed by means of an analysis of covariance, a Newman-Keuls test, and a Page's L-test.

Results

No significant differences between treatment groups, regardless of the prompting pattern or removal technique employed, were discovered. Learners in the control group, however, scored significantly lower than did learners in any of the treatment groups.

Conclusions

The following conclusions were drawn from this study:

1. Learner dependence resulting from the use of prompting in instruction is upon the assistance provided by prompting agents, and not upon the specific prompting agent being employed.
2. If prompting agents are used in a prompting pattern which uses a different prompting agent on successive trials of an instructional sequence, elaborate techniques for the removal of prompts are not necessary.
3. Extraneous visual prompting can be a powerful means for increasing the probability of a given stimulus evoking a given response.

VALIDATION OF MINICOURSE FIVE FOR SPECIAL EDUCATION

Joseph J. Stowitschek
Research and Development Specialist
Exceptional Child Center UMC-68
Utah State University
Logan, Utah 84322

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There is often a disparity between the amount of information presented in teacher in-service training programs and the amount of this information which is actually applied in the classroom. Minicourses show promise as a contribution to the solution of this problem. To date, minicourses have been validated only to the extent that modifications in teacher behavior occurred. A search of the literature did not yield evidence which assessed a subsequent modification in student performance as a result of the teacher participation in minicourse instruction. There was no evidence to indicate specifically that minicourses have utility for special education teachers.

This study examined some effects of Minicourse 5, a remedial mathematics tutoring package, on tutoring skills of teachers of educable mentally retarded children and on subsequent mathematics performance levels of their students. The design of the study included an experimental group of teachers who participated in Minicourse 5 along with corresponding experimental and control groups of students who were administered pre- and post-experiment tests of mathematics performance.

Videotaped samples of tutoring sessions were analyzed using the t-test for correlated means and the Wilcoxon matched-pairs, signed-ranks test to determine changes in teacher tutoring behavior and the degree of retention of this behavior. Significant increases in teachers' use of diagnostic questions, specific verbal praise, and manipulative items occurred. Teachers did not significantly increase their use of prompting questions, general verbal praise, other selected skills, demonstration techniques, nor evaluation and practice techniques.

Resulting effects of teachers' participation in Minicourse 5 on students was assessed via achievement in mathematics. Statistically significant differences in mathematics performance occurred in favor of students in the experimental group over students in the control group.

Conclusions arrived at from the results were that Minicourse 5 improves mathematics tutoring performance of special education teachers in selected skills and that these skills are pertinent to the teachers' instructional content. The validity of Minicourse 5 is supported for special education.

Abstract No. 5 Skailand

TEACHER EDUCATION THROUGH MINICOURSE 18: TEACHING READING AS DECODING

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Dawn Skailand, Ed.D.
Program Associate, Teacher Education Division
Far West Laboratory for Educational Research and Development
1855 Folsom Street
San Francisco, California 94103

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Stanford University
Stanford, California 94305

Introduction: The Minicourse Model of Teacher Education

The Minicourse is a self-instructional, performance-based course for teacher education, based upon microteaching (Bush & Allen, 1964; Allen & Fortune, 1966). Microteaching as developed at Stanford consisted of an intern teacher applying a skill in a videotaped lesson with a few pupils, replaying the tape and receiving feedback from a supervisor on the lesson, and replanning and reteaching the lesson. The Minicourse adds to the microteaching model the elements of inservice use and auto-instruction. It deletes the feedback of supervisors.

Minicourse skills are identified through a comprehensive literature review. Following development, the Minicourse undergoes three field tests, each of which is followed by the revisions indicated by that test. First is the preliminary field test, conducted with 6-10 local teachers, to find out whether and how the course will work. Also, some trend data are gathered.

The main field test is the primary research study of the Minicourse. Between 50 and 100 teachers test the course. Pre- and post-measures are used to determine the effect of the course on teachers and on pupils.

Last is the operational field test. This assesses the effectiveness of the course in sites without Laboratory assistance.

Several media are employed in the development and use of Minicourses, including printed handbooks and other materials, videotaped or filmed instructional models, and lesson evaluations using videotape or audiotape.

Minicourse 18: Teaching Reading as Decoding

The first reading Minicourse was born in June of 1970, to work in the decoding (pronouncing) portion of reading.

Over 160 research reports and authoritative opinions were reviewed. The instructional sequences of the resulting course cover letter recognition, sound-letter correspondence, larger correspondences, context clues, and independent word identification.

The course includes a teacher handbook, a coordinator handbook, pupil pretests, materials for the microteach lessons, and five lesson films.

The preliminary field test was conducted with 10 teachers at two schools in San Francisco and Albany, California.

The main field test was held in Chicago; Washington, D.C.; Montgomery County, Maryland; and San Lorenzo, California.

Four questions were asked in the main field tests:

1. Will teacher behavior change after using Minicourse 18? Comparisons of teacher behavior before and after the course showed significant changes in course-approved directions in 83% (24 out of 29) of the behaviors analyzed.
2. Will teacher entry and gain scores differ for central city and suburban teachers? There were no significant differences between central city and suburban teachers in most (84-87%) of the behaviors on either the entry or the gain scores. One interesting difference was that telling (as opposed to asking) was more frequent in central city schools.

3. Does reteaching the lessons improve teacher skill? Four reteach treatments were applied: reteach all lessons, reteach some, teach to mastery, and no reteach. Teachers in the four treatments did not differ significantly in 24 of the 29 behaviors.
4. Does Minicourse 18 have an effect on pupil reading achievement? Laboratory tests and two subtests of the Stanford Achievement Test were administered to pupils of Minicourse 18 and control teachers. These data will be reported at the session.

MEDIA PRESENTATION AND CONCEPT REPRESENTATION VARIABLES IN INDEPENDENT LEARNING

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Stanford, California 94305

Thomas G. Nielsen
Assistant Professor
School of Education
127 Huntington Hall
150 Marshall Street
Syracuse University
Syracuse, New York 13210

John Moore
861 Fedora, Apt. 12
Los Angeles, California

Purpose

The purpose of this study was to utilize and assess the feasibility of a media research paradigm which separates for analysis the modes by which concepts are represented from the media by which they are presented in independent learning settings.

Procedure

The study consisted of four related 2x2x2 experiments. Eight separate media treatements of a lesson on concepts of flipcard animation were prepared for use in the four experiments. The effects of four variables were studied. The mode of representation variable contrasted two verbal styles, termed Iconic and Symbolic. One presentation variable–the media presenting the verbal component–contrasted Tape and Booklet. The second presentation variable–the media presenting the pictorial component–contrasted super 8mm Filmloop and Filmstrip. The organismic variable contrasted 9- and 11-year-old learners. In each of four experiments elementary pupils were randomly assigned to four treatments, 48 subjects in each of two experiments, and 47 in each of the two remaining experiments. All subjects completed the media treatment and tests, individually, in independent learning settings. Measurements of performance were made by transfer-of-learning tasks and an objective test. Time-to-completion data were recorded for treatment, transfer tasks, and objective test. The general linear hypothesis, *F* test, *t* test, and a test of power were employed in the analyses of the data.

Results and Conclusions

The results and conclusions of the study are summarized:

1. There was no substantive evidence of a congruence of modes of representing concepts in multimedia lessons and of age levels.
2. It was concluded, with confidence, that Iconic and Symbolic modes of concept representation did not differ, significantly, in effectiveness.
3. It was concluded, with confidence, that Filmloop and Filmstrip multimedia lessons did not differ, significantly, in effectiveness.
4. The Tape/Filmloop treatment was more effective than the Booklet/Filmloop treatment, but the Booklet/Filmstrip treatment was more effective than the Tape/Filmstrip treatment.

5. Booklet treatments tended to be more time efficient than Tape treatments.
6. Results of the four experiments suggested a possible three-way interaction among verbal and pictorial Media and Modes, interactions not directly investigated in this study.
7. A subtest composed of verbal-type items appeared to be more sensitive to interactions among variables than pictorial or performance tests.

Abstract No. 7 LaPointe, Nielson and Moore

ICONIC AND SYMBOLIC REPRESENTATION MODES THROUGH MEDIA PRESENTATIONS IN AN INDEPENDENT LEARNING SITUATION

Jacques LaPointe
Professeur, Université du Québec
300 ave des Ursulines
Rimouski, P.Q., Canada

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Problem

The purpose of this study was to determine the instructional effectiveness of the modes by which instruction is represented and the media through which the representation modes are presented in an individually prescribed situation with 9- and 11-year-old students. The theoretical position of the study was that there is a similarity between the modes used by children to abstract reality and modes representing concepts in media presentations.

Procedures

The study consisted of a 2x2x2 experiment. Four self-contained instructional packages were prepared. One filmstrip and one filmloop lesson on concepts of flipcard animation were produced. Three variables were considered: (1) the iconic and symbolic modes of representation; (2) the presentation variable presenting the images, which consisted of super 8mm color motion pictures and 35mm film strip; (3) two age levels, nine and eleven years old. The booklet was the medium by which the verbal component of the treatment was presented. The iconic mode was used in one half of the treatments. For the iconic mode, the pictorial images were the main stimuli by which the concepts were represented. The other half of the treatments used the symbolic mode. Each symbolic treatment has a verbal and pictorial component. The concepts taught by the symbolic treatments emphasized more of the verbal component than of the pictorial component of the concepts represented.

The experiment was conducted with 48 pupils randomly selected and assigned to four different media treatments. The test consisted of a performance subtest and two subtests with pictorial items matched by verbal items. Efficiency was estimated by time-to-completion measures for the lesson and the subtests. A statistical power approach was applied when no differences were hypothesized.

Findings

Hypothesis 1.0, that the effectiveness of the representation modes was related to the ages of the learner, was not supported for the symbolic treatment (.05). At the iconic level the hypothesis of n.s.d. could not be retained with confidence (.12). The hypothesis of n.s.d. in performance means of the iconic and symbolic treatments was supported with confidence (.01).

Hypothesis 2.0, that the effectiveness of the modes of representation was a function of the medium of presentation, was not tenable (.10).

Hypothesis 3.0, that the effectiveness of the medium of presentation was a function of the age levels, was not tenable (.10) for the written subtest and total test.

Hypothesis 4.0, that there was a significant difference in mean time-to-completion between the filmloop and the filmstrip, was rejected (.10), but a significant difference (.10) was observed in terms of variability for the time-to-completion of the treatment favoring the filmstrip treatment.

Hypothesis 5.0, that the variability of performance is a function of the modes of representation, was not supported (.10). The variability of performance being a function of the age levels was supported (.10) for the total test.

Rather than seeking criteria to verify the overall presence of the two modes of representation, it would have been preferable to select a concept similar to "conservation." This concept, being more specific and already investigated empirically, would have been easier to control and to measure.

Abstract No. 8 Anastasio

PHOTOGRAPH SEQUENCING AS A METHOD OF EVALUATING THE KNOWLEDGE AND CONCEPTUALIZATIONS GAINED FROM A FILM BY PRIMARY AND INTERMEDIATE EDUCABLE MENTALLY RETARDED CHILDREN

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John Anastasio
Media Specialist
Computer Based Project
Prescott School
410 East Willow Street
Syracuse, New York 13203

A problem developed in employing interview techniques with low verbal children for evaluating the cognitive effects of films. It was proposed that some form of overt activity such as sequencing pictures might be used as a substitute measure.

The study investigated the hypothesis that the ability to correctly sequence a series of photographs depicting a concept from a film was not significantly correlated to verbal, visual, and auditory scores as recorded in an interview. That is, that children who were classified as being low in verbal expression in the interview did gain knowledge and understand concepts from a film presentation and indeed, could communicate this achievement by sequencing photographs which depicted a particular concept presented in a film. Two related questions were concerned with the difference in sequence scores at different grade levels and between children who saw a film and those who did not.

The study involved 40 primary and junior high school mentally handicapped children and 20 nonhandicapped fourth graders. One half of each group saw a film. All were asked to sequence a picture set of a film concept. During the sequencing, subjects were asked to justify the order of the photographs. Those who saw the film were interviewed using a standard format. Scores were derived for the sequencing activity, the verbal, visual, and auditory parts of the interview and the judgment of the experimenter on concept definition.

Rank order correlations were obtained comparing sequence scores and scores on the interview and a 3x2 design compared the three grade level differences with the scores of children who saw and did not see the film.

It was found that the grade level correlations between sequencing ability and verbal, visual, and auditory expression were not significant ($p < .05$). Significant differences were found between the sequence scores for students who saw the film and those who did not. Correct concept definitions were very apparent (80%) for those who saw the film and not apparent (10%) for those not seeing it. The grade level differences in scores within the above treatment groups were not significant.

It can be concluded that sequencing is one method of evaluating the knowledge and concepts gained from a film, especially for children who are low in verbal ability.

Further implications might be:

1. Sequence kits be furnished with films (or lessons) so that teachers can evaluate previously stated objectives with children who are low in verbal ability.
2. Sequence kits be used with mentally handicapped children in connection with activities in problem solving and logical thinking.
3. "Creative" sequencing may be used to evaluate objectives in the affective domain. This would involve children in creating their own sequence to indicate their attitude toward a particular concept.

Abstract No. 9 Scholl

A PILOT STUDY TO TEST THE EFFECT OF VISUAL STIMULUS PRESENTATION STRATEGIES ON LEARNING A MOTOR SKILL

Paul A. Scholl
Assistant Professor of Education U-1
University of Connecticut
Storrs, Connecticut 06268

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A previous study which compared single image presentation strategies with multiple image presentation strategies by the author indicated that learning was significantly faster, and occurred with fewer errors when images were presented four at a time rather than sequentially, one at a time. The present study was an attempt to apply the multiple image strategy for presenting visual stimuli in an operational learning environment. Bruner noted that learning can be made easier by reducing the cognitive strain, or memory requirement, needed for a problem solution. Multiple image presentation strategies require subjects to retain less information over a given period of time, and therefore it seemed reasonable to hypothesize that multiple presentation strategies would provide a significantly better learning environment.

The specific hypotheses tested by this study were: (1) When teaching a psychomotor skill, presenting visual images four-at-a-time will decrease the time to criterion when compared with one-at-a-time image presentation of the same stimuli and (2) when teaching a psychomotor skill, presenting visual images four-at-a-time will decrease the number of errors made on the criterion test when compared with one-at-a-time image presentation of the same stimuli.

Two self-teaching carrels were used to teach the operation of a 16mm motion picture projector. One carrel presented a linear visual program one-image-at-a-time while another carrel was modified to present the same visual program four-images-at-a-time. Size of the visual stimulus material was held constant and the total environment remained the same except for the experimental variable.

The Minnesota Rate of Manipulation test, a test of manual dexterity, was given to each subject. Records were kept of the amount of time required to complete the criterion test and the number of errors made during the criterion test. Subjects were randomly assigned to the normal (one-at-a-time) training condition or the experimental (four-at-a-time) training condition.

Simple t-tests were applied to the data. No significant differences were found. A t-test applied to the rate of manipulation scores by training condition were non-significant indicating that the experimental and control groups had equal manual dexterity as measured by the Minnesota Rate of Manipulation test. The t-tests applied to the time to criterion and criterion test errors were not significant. Both hypothesis 1 and hypothesis 2 therefore were rejected as untenable.

Further research in this area will require more complex tasks, tasks that have no emotional component and presentation strategies which can be precisely controlled and accurately timed.

Abstract No. 10 Lawrason

THE EFFECT OF THE SEQUENCE OF INSTRUCTIONAL EVENTS IN A CONCEPT LEARNING TASK IN FILM STUDY

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Robin Edgar Lawrason
Assistant Professor
Faculty of Education
University of British Columbia
Vancouver 8, B.C., Canada

Purpose

Two instructional events were manipulated to determine the effect of variations in their order of presentation upon learner achievement: (1) definition of concept attributes, and (2) practice in identifying the attributes in filmed exemplars.

Rationale

With the advent of more systematic procedures for the development of instructional materials, further investigation into the individual components of the instructional process is necessary. Bruner (1961) in his discovery learning approach maintains that exemplars of a concept should be presented prior to verbalization of the concept. Ausubel (1963) in his inductive approach maintains that learning is more effective if the concept is presented prior to exemplars. Research comparing the two approaches has been inconsistent in two factors: (1) in operationally defining instructional variables; and (2) in reporting any conclusive results.

Procedures

An instructional unit on recognition of visual symbols in contemporary film was systematically designed and developed. Four concepts for identifying symbols through cues given by the film director were defined. Several short 8mm exemplars of each concept were filmed for use as illustrations and mastery item practice. The unit consisted of a booklet containing verbal descriptions of the concepts of symbol recognition, and mastery item practice questions. Filmed exemplars and instructions were rear-screen projected at the front of the classroom at times appropriate for each treatment. Each seventy-five minute treatment session was paced by the unseen experimenter behind the rear screen.

Subjects (131 fourth year education majors) were randomly assigned to six treatment groups and one control group. Five treatment groups received identical elements of the film study unit: treatments differed only in respect to: (1) the order of the definition of concepts, and practice with exemplars (concept before practice, practice before concept, and practice before and after concept); (2) the number of concepts present at one time (one, three, or four). Group six received a practice only treatment. The control group was given an unrelated task. All groups received pre- and post-tests based on a five minute segment from Polanski's *Two Men and a Wardrobe* (1956).

Results

Significant differences were found between the post-test means of the first four treatment groups and the mean of the control group at the .01 level. The fifth group, receiving all practice prior to concept definition, was significantly different from the control group only at the .05 level. There was no significant difference between group six and the control group. A Scheffé calculated on the five significant treatment means did not reveal significant differences between these groups.

Conclusions

Results indicated that when both concept definition and practice with exemplars are included in an instructional sequence, their order of presentation is not an essential factor in facilitating learning. These results might be explained by the power of the product development cycle used to ensure that all components of the learning task were included in the unit. Further research suggested to test this premise should also include: (1) more time to practice with exemplars; and (2) more powerful reinforcement to ensure learner response throughout the unit.

Abstract No. 11 Jacobsen and Gerlach

A COMPARISON OF THE EFFECTS OF TEXTUAL AND TELEVISED MODES OF INSTRUCTION IN TEACHER EDUCATION

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Dr. David A. Jacobsen
Associate Professor
College of Education
The University of North Florida
P.O. Box 17074
Jacksonville, Florida 32216

Dr. Vernon S. Gerlach
Chairman, Department of Educational Technology
College of Education
Arizona State University
Tempe, Arizona 85281

Purpose

This study was designed in order to learn whether or not televised instruction would produce different results from instruction delivered by means of textual materials when the desired outcomes of instruction are certain specified and observable teaching techniques.

Rationale

This research differs markedly from most instructional TV studies undertaken to date. Most studies have dealt with whether or not ITV can teach better than a teacher. The teacher is not used in this study; rather, printed materials were used in a modular form. The second major difference dealt with a measurement of teaching behavior as opposed to the traditional paper and pencil test.

Procedures

Students in this study were eleven juniors majoring in education at the University of Georgia who were concurrently participating in the Indian Teacher Training Project. Two groups were randomly assigned to treatment; each group received instruction in "questioning strategies for classroom teacher," one group via textual materials and the other via television.

Following administration of treatment, each student engaged in a five-minute micro-teach activity which was videotaped. After approximately six weeks, each student was observed for three 20-minute periods in an actual classroom during his student teaching assignment.

Both the videotaped micro-teaching activity and the actual classroom periods were observed and analyzed in terms of the following criterion variables: (1) amount of redirection, (2) number of probes, (3) number of comprehension questions, (4) number of analysis questions, and (5) number of evaluative questions.

The instrument used to collect data was the "Questioning Strategies Analysis Sheet," designed and validated by Professor James W. Bell, Arizona State University. Data were analyzed by means of a t-test for each of the five criterion variables.

Results

Arbitrary minimum performance criteria were established, a priori, for each of the five criterion variables. Regarding the microteaching, mean performances exceeded all criteria for both groups with the ITV group in the area of evaluative questions being the single exception. Regarding the three periods of student teaching, mean performances exceeded all criteria for both groups in all but the evaluative area.

No significant differences between treatment groups were obtained for any of the five criterion variables when performances during the three student teaching periods were compared.

Conclusions

The results of this particular study indicate that the more expensive TV instruction failed to produce a criterion performance which differed significantly from that produced by the less expensive textual instruction. The implication is clear: there is no benefit resulting from the use of TV instruction, per se, if the instruction can be presented via a textual mode. When instruction is available only in a televised form, it would be well to consider whether or not a transcribed text (script) would produce the same results before investing in the resources necessary to present televised instruction.

Modifications of the study are suggested for replication and further investigation.

Abstract No. 12 Reavis and Rickert

TEACHING PACKAGES FOR PARENTS

Dr. H. Kenton Reavis
Assistant Professor
Child Study Center
Old Dominion University
Norfolk, Virginia 23508

Dr. Devoe C. Rickert
Associate Professor
Exceptional Child Center
Utah State University
Logan, Utah 84321

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Purpose

The purpose of this study was to measure the effects of parents teaching their children basic math facts by using mediated teaching packages.

Rationale

There are not enough professionals available to furnish training programs for all the parents of children having difficulties in school. Parents do change behavior, intentionally or unintentionally, and therefore can be active, systematic participants in arranging the circumstances to most efficaciously teach new academic behaviors to their children. The packages, proposed as an alternative to the direct use of professionals to train parents, were designed using principles of instructional technology and direct math teaching techniques.

Procedures

The subjects for this validation study were students drawn from four elementary schools in an urban community in a rural area with a population of over twenty-six thousand. Parents of children who were referred by teachers and tested four months below grade level in math skills were contacted by letter and asked if they would participate in a program to help their child. Children whose parents agreed to participate were randomly assigned to experimental and control groups. The teaching packages were then taken home by students in the experimental group. The parents of control group students were sent a letter explaining that they would participate at a later date.

After one month students in both experimental and control groups were post-tested. Teaching packages were then sent home with the control group students. After another month, both groups were again post-tested.

Post-test scores from the two post-testings using the California Achievement Test (CAT) level form 2A (1970) and the Criterion Math Fact Test (CMFT) rates were used as two primary sources for data on the effects of the packages on student performance. The Kuder-Richardson Formula No. 21 was used to estimate reliability for this sample on CAT and CMFT pre- and post-test scores. The post-test scores on the CAT and CMFT were analyzed by one way analysis of covariance, using the pre-test scores as the covariate.

Results

Ninety-six percent of parents contacted agreed to participate in the program. Of the one hundred fifty-three students beginning the program, one hundred fifty-one were available for the first post-testing. The r for the CAT was .96 and for the CMFT .98. Eight of the eleven F-ratios from the first post-testing were significant between the .05 and .001 levels. The F-ratios from the second post-testing indicate the control group also made accelerative gains and that the experimental group maintained the gains they had made one month earlier. The data from the parent evaluations indicated that parents reacted positively to the package format and thought the packages to be of benefit to their children.

Conclusions

In terms of changes in mathematics achievement the mediated teaching packages used by the parents appear to be an effective mode of instruction for teaching children the basic math facts. There did appear to be concomitant improvement to other fact areas and certain process areas as a result of instruction via the package in selected fact areas. The concomitant improvement appeared strongest when the addition and division packages were used. At the termination of the program parents responded positively to a written questionnaire concerned with their evaluation of the teaching packages.

IMAGERY DIRECTIONS AND RELEVANT DRAWING IN A PROSE LEARNING TASK

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Richard C. Boutwell
Assistant Professor
Dept. of Education
Bucknell University
Lewisburg, Pennsylvania 17837

William C. Low
Graduate Student
Brigham Young University
Provo, Utah 84601

John Hughes
Graduate Student
Brigham Young University
Provo, Utah 84601

The ability to form a vivid mental picture in one's mind through the use of highly structured mnemonic devices such as narrative stories and pegword systems has resulted in highly accurate recall. The purpose of this study was to eliminate the structured mnemonic device and instruct half of the college students to form mental pictures, i.e., construct their own mnemonic, as they read the 2511 word prose passage. The second factor of the experiment was to divide the subjects into thirds based on accompanied drawings with the prose; i.e., adjacent to each paragraph there was either a relevant drawing, irrelevant drawing, or no drawing. A relevant drawing is one in which the content of the paragraph is pictorially represented. Our purpose was two-fold; first, to measure the amount of interaction of drawings with imagery instruction; and second, to determine the content redundancy value of drawings on subject's recall.

The procedure called for the use of prepared booklets which included prose passages on the left side of each page and one of the three types of drawing presentation adjacent on the right side of each page. The instructions provided with the booklets were of two types: (1) form mental pictures as you read the text and be prepared for a post-test, and (2) read carefully and be prepared for a post-test.

The analysis of the post-test errors revealed a significant effect of instructions versus no instructions to form images ($p < .01$) and significant effect of relevant versus irrelevant drawings ($p < .01$). The interaction was non-significant.

The use of relevant drawing accompanying textual material is useful with subjects who see the redundancy with the drawing. Further research on this effect is essential with younger students since in some preliminary studies we have results which suggest that if the drawing is too detailed and colorful, it might detract from the textual concepts. A similar phenomenon may also occur with imagery instruction. This present study seems to support the position that mental images formed by the subject during reading help him to recall that material at a later time. Yet, some data received on a pilot study of fourth graders suggests that imagery instructions were interfering with recall. Therefore, it is felt that further research on the interaction of imagery instruction and age needs to be conducted.

THE USE OF INFERRED OBJECTIVES WITH INSTRUCTIONAL FILMS

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Patrick E. Smith
Graduate Research Associate
Department of Educational Technology
Arizona State University
Tempe, Arizona 85281

Kenneth C. Roberts
Educational Technologist
Maricopa County Community College District
Phoenix, Arizona

Curtis L. Taylor
Educational Technologist
Colby Community College
Colby, Kansas

Purpose

This study was conducted to determine the effects of presenting objectives prior to viewing an instructional film from which the objectives were inferred. Post-instructional performance on the objectives presented to learners and on objectives inferred from the instructional material but not specified for the learners were compared.

Rationale

Supplying students with behavioral objectives for a set of instructional materials is commonly believed to facilitate learning. Some studies (Allison, 1964; Blaney and McKie, 1969; Dalis, 1970) indicate positive effects from such a procedure, while other studies (Jenkins and Deno, 1971; Stedman, 1971) indicate that the availability of objectives does not affect performance. Generally, the studies yielding positive results from presentation of objectives have used materials that were not originally developed from specific behavioral objectives. Investigations showing that objectives were not effective typically involved the use of materials that were designed to meet specific objectives. It seems plausible, therefore, that objectives enhance post-instructional performance only when they have not been specified prior to development of instruction.

Procedures

Two types of materials, a film and a list of instructional objectives, were employed in the study. The film, *The Remarkable Schoolhouse*, produced by CBS Television, 1967, served as the instructional material. This 25 minute color film describes the organization and activities of three "innovative" school systems in the United States.

Two lists of instructional objectives were independently inferred from the film's content by two of the experimenters. Eighteen objectives were common to both lists and were therefore selected to serve as the final set of inferred objectives for the film. The eighteen objectives were used as the basis for constituting four treatment groups.

As each subject entered the classroom, he was randomly assigned to one of four treatments and was given the instruction sheet appropriate to his particular group. A total of 16 subjects were assigned to each group. The content of the instruction sheets for the four groups differed as follows: Group 1—all 18 objectives; Group 2—the nine odd-numbered objectives; Group 3—the nine even-numbered objectives; Group 4—no objectives, but directions to subject to pay attention to details and examples. An eighteen-item criterion test was administered to all groups immediately following the film. The test contained one item for each objective.

Results

The post-test mean scores for each treatment group indicated that the three groups receiving a complete or partial list of objectives scored significantly higher than the group receiving no objectives ($F = 5.68$, df 3/92, $p < .01$). Subjects who received partial lists of objectives performed equally well or slightly better on the test portion for which they received no objectives than did subjects who only received directions to pay attention to details and examples.

On the test items covering the even-numbered objectives, the mean scores for the two groups that received lists of even-numbered objectives (Groups 1 and 3) were significantly higher than the scores for the two groups that did not receive these objectives ($F = 4.16$, df 3/92, $p < .01$). Group 3 (even-numbered objectives only) scored significantly higher than both groups that did not receive lists of even-numbered objectives. Group 1 (all objectives) scored significantly higher than the no-objectives group (Group 4), but the difference between Groups 1 and 2 was not significant.

Conclusions

This study indicates that providing objectives to students prior to presenting instructional material that was not based originally on objectives will facilitate student performance. The evidence does not support the notion that the facilitating effect is at the expense of student acquisition of information other than that specified by the objectives.

ALGORITHMS IN TEACHING AND LEARNING–A THEORETICAL STATEMENT

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Vernon S. Gerlach
Box FLS/ASU
Arizona State University
Tempe, Arizona 85281

Fritz H. Brecke
Box FLS/ASU
Arizona State University
Tempe, Arizona 85281

During the past decade, scholars in Germany, Great Britain, and the Soviet Union have published a substantial amount of material dealing with the application of algorithms and algorithmic procedures to instruction. This paper reviews the most significant European concepts, describes what is being done in the U.S.A., and identifies problems worthy of serious research endeavors.

An algorithm is a list of unambiguous elementary instructions specifying a sequence of discriminations and operations which will yield the solution to any problem of a class.

Algorithms may vary in the degree to which they are deterministic. Likewise, problems may vary in the degree to which they are amenable to solution by algorithms or algorithmic procedures. A concise taxonomy of algorithms based on these characteristics is presented. The applicability of algorithmic concepts to various types of problems is discussed and illustrated by means of concrete examples.

SELF-PACING IN A PERSONALIZED SYSTEM OF INSTRUCTION: WORK PATTERNS AND COURSE COMPLETION

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K. Anthony Edwards
Department of Psychology
Utah State University
Logan, Utah 84322

Richard B. Powers
Associate Professor
Department of Psychology
Utah State University
Logan, Utah 84322

Personalized instruction is characterized by five features: (1) self-pacing, (2) emphasis on the written and oral word, (3) lectures as motivators, (4) unit mastery before advancement, and (5) proctors. In PSI courses, it is not known when students start to work, when they finish their work, or the rates at which they work. This paper describes student work records in a completely self-paced introductory psychology course.

One hundred and eighteen students enrolled in the course and 93 students completed it. Sixteen managers assisted as oral interviewers or as written exam testers. Oral interviews were taken from interviewing managers or other students until satisfactorily completed. After every third oral interview, students were allowed to take a written exam. If the exam was passed, the student was allowed to take interviews over the next three units. If the exam was failed, the student was required to take an alternative test at a later date. This procedure was continued until the student passed all exams. All students could get an "A" in the class by completing all tests and interviews. Attitudes toward the course and interest in psychology were surveyed on the last test day.

Although students could finish the course in five weeks, 44% of the students waited until the tenth week to do so. Nearly all students who started work during the first opportunity finished the course, but as the weeks passed prior to the first attempt, the percent of students completing the course diminished.

Individual records of test-taking rates showed three patterns of working: (1) pausing followed by a high sustained rate of taking exams (20% of the students); (2) linear, evenly paced tests (40% of the students); and (3) positively accelerated or "scalloped" test-taking (25% of the students). About half of the students took at least one written exam each week once they started to work. Most of the students who skipped an entire week did so after taking one of the first four exams. Students who dropped from the course (21%) did so after one of the first three exams but nearly all had passed the last exam taken.

More than half of the students indicated that the course was the most interesting and most informative of the courses taken that quarter, and about one third of the students mentioned that the best thing about the class was the self-pacing feature. More students shifted toward becoming majors than shifted away (47% to 20%) and more shifted toward becoming minors (56% to 18%).

The correspondence between starting and completing the course was interesting. It would appear that we should reinforce taking exams early and maintaining some minimal pace. If the student starts early and finishes early, both the instructor and the student gain. In this study, attitudes toward class were better for those students who finished early and more students who finished early shifted their interest toward majoring or minoring in psychology than those who finished late.

Abstract No. 17 Simmons

EXTRA-COMMUNICATION VARIABLES IN THE ACQUISITION OF INTERNATIONAL ORIENTATIONS AMONG ADOLESCENTS

Jimmie R. Simmons
College of Education
408 Miller Hall
University of Washington
Seattle, Washington 98105

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Political socialization has been an area of increased concern during the last decade. In light of the proliferation of political socialization literature, it is interesting to note that few empirical studies have been designed to examine communicative interactions between the societal/informational environment and individuals within that environment. The situation is particularly critical in relation to studies devoted to isolation of sources of international socialization.

To date, only three investigators have conducted empirical research studies which have attempted to isolate sources of orientations to international objects (Hollander, 1970; Haavelsrud, 1970, 1971, 1972; and, Coldevin, 1971, 1972). The work of both Hollander and Haavelsrud is concerned with socialization regarding concepts of War and Peace, whereas Coldevin investigates the acquisition of transnational orientations. Each of these studies identifies the mass media, and television in particular, as the principal agents of international socialization amongst a significant portion of high school subjects in the United States and Canada.

Klapper (1958) identified "extra-communication variables" as those variables extrinsic to the communication itself "which mediate the effects of television, and the results of such mediation." The study described here investigates certain extra-communication variables which mediate the utility of sources of orientations among adolescents towards concepts of War and Peace. It is the purpose of this study to: (1) examine sources of international socialization (vis-a-vis concepts of War and Peace) amongst subjects of socio-economic and racial identifications other than those treated in the Hollander, Haavelsrud or Coldevin investigations; and, (2) to investigate the effects of an absent parent upon the utility of sources of orientations, i.e., subjects from single parent, female head of household homes vs. subjects from dual parent households.

Three hundred subjects (ages 16-18) were randomly chosen from a pool of 3,500 high school students to assess the relative impact of family, friends, mass media, school, and religion in acquiring opinions about War and Peace. Subjects responded to an open-ended questionnaire during one fifty-five minute class period. Approximately two-thirds of the sample were Caucasian, while the remaining one-third were Negroid. Comparisons were made in reference to sex, ethnicity, and familial configuration variables.

Significant differences ($< .05$ and .01 levels) were found on the basis of independent variables as these variables influenced the utility of sources of orientations. Important differences between the sample treated in this study and the 1970 Haavelsrud study were also identified.

The data generated by this study support the conclusions of Hollander, Haavelsrud and Coldevin in that mass media, and television in particular, were found to be the principal agents of international socialization amongst high school subjects. The expectation that this finding would be increased at socio-economic levels lower than those surveyed by Haavelsrud, and with subjects of the black student population, was also confirmed. It would seem that the political socialization influences of the family are being increasingly eroded, at least as regards socialization towards concepts of War and Peace. Furthermore, when the home environment is lacking a male model, the influence of alternative socialization channels, most particularly television, increases substantially.

Abstract No. 18 Haavelsrud

PERCEPTIONS OF SOURCE UTILITY IN THE FORMATION OF INTERNATIONAL ORIENTATIONS AMONG SECONDARY SCHOOL STUDENTS IN NORWAY

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Magnus Haavelsrud, Ph.D.
Visiting Associate
Institute for World Order, Inc.
11 West 42nd Street
New York, New York 10036

During the fall of 1972 data were collected among secondary students in Oslo, Norway (random sample) on their perceptions of source utility regarding the formation of orientations towards war/peace concepts. This study was a replication of previous studies made in Seattle, New York (U.S.A.) and Vancouver, B.C. (Canada). Another replication is being conducted in Bern, Switzerland. The data from Oslo will be compared with data from these other locations to the extent that samples are comparable.

The main hypothesis of this study is that the input of sources vary cross cultures in relation to the different communication patterns found in the cultural settings. Thus, it is expected that the utility of television will be less in Norway and Switzerland as compared to the U.S. and Canadian samples. Furthermore, it is expected that interpersonal and school sources have greater impact in the European setting than in the North-American setting.

The need for further research on source utility will be specified.

Abstract No. 19 Hull

A COMPARATIVE STUDY OF SELECTED ETHNIC CHARACTERISTICS OF INFORMATION SOURCES AND THEIR INFLUENCE ON THE RECEIVER

Dr. Gary L. Hull
Assistant Professor of Secondary Education
Kent State University
Kent, Ohio 44242

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Stanford, California 94305

Purpose

The purpose of the research was to investigate the influence that selected ethnic variables of an information source have on selected black and white pupils. Specifically the research was focused on the auditory and visual channels of the information source (taped slide presentation) and their effects on the intended audience. The major concern was to determine if white or black pupils were influenced more by an information source with one set of ethnic characteristics.

Rationale

The receivers' perceived credibility of the information source is an important factor in determining the effectiveness of a communication. When an information source is perceived by the audience to have a low degree of credibility the impact of the message is often affected. This research investigated the hypothesis that ethnic reference group membership positively or negatively affects the receivers' perception of the source, when the source possesses similar or dissimilar characteristics from those of the receivers.

Procedures

The subjects that participated in the research were selected from a population comprised of sixth-grade pupils attending a single public elementary school within a city of 200,000 people. The school was located in a racially-mixed neighborhood. Sixty white subjects and sixty black subjects were randomly selected from the population and then randomly assigned appropriately to one of six treatment groups.

All six treatment groups received the same message from an information source in a tape/slide format. Two variables in the information source, the voice of the narrator (either a black voice or a white voice), and the race of the people depicted in the visuals were manipuated for study. The two voices were selected from voices previously determined to be distinguishable as either belonging to a black or white individual. The visuals depicted either all white people or all black people or a combination.

Five instruments were designed for the research. One was a retention test. Three semantic differential scales were also designed to measure the subject's concept of "trustworthiness" and "expertness" of the information source, and the "concept acceptability" of the message. A fifth instrument was developed to measure the subject's "preference" for the six different combinations of voice and visuals of the information source.

An analysis of covariance for the retention test and a multivariate analysis of variance for the attitude scales were used in testing the seven statistical hypotheses for the main effects or the interaction effects. All hypotheses were tested using the .05 level of confidence.

Results

Analysis of the data supports the following results:

1. There were no differences in terms of pupil (both black and white) response to either the black or white voices.
2. The significant differences were present in terms of the black pupils' reaction to the visuals with all black individuals, or with all white visuals or a combination of white and black individuals.

3. A significant difference at the .05 level was found in the white pupils' response on the "expertness" scale, and the "preference" scale. The results showed that white pupils rated the information sources with visuals depicting all white people or a combination of white people and black people higher in "expertness" than information sources with visuals depicting only black people. A significant difference was also found in the white pupils' "preference" for the same visuals.

Conclusions

It appears from these results that information sources in this format could incorporate distinguishable black voices for use with both black and white audiences. It is also concluded that visuals representing a combination of white and black individuals are readily accepted by both races, but visuals representing only blacks are not yet fully accepted by white pupils.

Abstract No. 20 Coldevin

EDUCATIONAL COMMUNICATIONS AND THE FORMULATION OF NATIONAL AND INTERNATIONAL ORIENTATIONS

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Gary O. Coldevin
Assistant Professor
Graduate Studies in Educational Technology
Sir George Williams University
Montreal 107, Quebec, Canada

A direct consequence of high technology within North America has been variously labelled as "Global Village" communication dissemination. How this information implosion affects the process of national and international socialization among the television generation, however, has been the subject of limited direct research attention. Given the ubiquitous nature of the television medium and the amount of time pre-adults devote to viewing, a fair question which emerges from this state is, how effective have the schools remained as a dominant source for these socialization processes? Is the informational impact in fact higher outside than within the formal school environment?

Purpose

The present study was undertaken to:

1. Assess the relative impact of the mass media in general and television in particular as primary sources for North American adolescents' national and international orientations;
2. Isolate the specific content categories of television and formal educational media primarily utilized as sources.

Procedures

Essentially three variables were isolated for analysis in this study: 1) Attributes for both alternatives of general international issues; 2) Perceived sources for attribute enumeration; 3) The most important source influencing a national or international decision posture toward international issues.

The samples were deliberately drawn from 11th grade World History classes. A random sample of 200 students each were selected from high schools in Seattle, English (Protestant) and French (Catholic) schools in Montreal (N = 600). Opinions to both sides of seven general international issues (ranging from immigration to patriotism) were elicited prior to asking for a Yes or No decision (e.g., "Do you think it would be better to be a citizen under a world government than a citizen under the government of one country only?") to basic objective questions.

Additionally, subjects were asked to identify the *one* most important attribute influencing their decision orientation.

A second task required subjects to provide the code of the most important source for each answer given to the international and national alternative of each question. Codes were listed for friends, family, school based sources, general mass media sources, specific television content sources, personal travel and religion.

Each attribute and most important source mentioned for the attribute were extracted through a dyad coding process. Through this type of content analysis, a most important source was correlated with all attributes supplied.

Results

The dominance of the mass media as the primary source grouping for both national and international alternatives is pronounced throughout all samples. Both Canadian samples, however, are significantly more "mass media" attached ($p < .001$) than their American counterparts. This significant difference was also detected in the most important source influencing a majority of the national or international decision orientations. For all samples, the major specific sources of information were TV

newscasts and TV documentary films. The school was ranked secondary in overall source importance with the teacher emerging as the dominant single source. Text books were rated as the second most important school source with films following in third priority. Television in school was rarely mentioned.

Conclusion

These results bring into relief the increasing need for enrichment of the formal learning environment in harmony with developments in educational communications. The transition from an information poor to information rich home environment implies that an extended, combined use of educational and mass media in curriculum design and classroom presentations may be particularly requisite. This study suggests that the role of the school must undergo an intense transformation if it is to function as a critical socialization agent.

The ERIC Clearinghouse on Information Resources
Stanford Center for Research and Development in Teaching
School of Education, Stanford University, Stanford, California 94305 (415) 321-2300 x3345

Specializing in Materials and Strategies for Learning

March 1974

The new ERIC Clearinghouse on Information Resources, formed from a combination of the ERIC Clearinghouse on Media and Technology and the ERIC Clearinghouse on Library and Information Sciences, is pleased to be able to cooperate with the AECT Research Committee and Dan Isaacs in making available these abstracts for distribution at the AECT Annual Convention.

We hope that we can be of other service to you as well. If you are not familiar with ERIC (Educational Resources Information Center), or with the new ERIC Clearinghouse on Information Resources, please take the time to read through our brochure.

The research abstracts are listed on the back of this letter in the order in which the papers are to be presented.

Richard E. Clark
Clearinghouse Director

RESEARCH ABSTRACTS

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2. Fritz H. Brecke and Vernon S. Gerlach, "The Effect of Instructional Cues on Learning in a Simulated Environment"
3. John E. Splaine and David J. Bowering, "Team Teaching: Student Perceptions of Two Contrasting Models"
4. Keith Collins, Howard L. Stone, Wayne I. De Master, and Harry Knopke, "The Relationship Between Student Achievement and Manipulated Learning Environments"
5. Jack H. Bond, "A Review of Recent Findings About Student Responses to Films"
6. David M. Tuttle and Roydon S. Olsen, "The Effect of a Graphic and Explicit Representation on the Acquisition of Sentence Generation Skills in a Foreign Language"
7. Perrin E. Parkhurst, "Assessing the Effectiveness of Self-Paced, Visualized Instruction; A Multifactor Analysis on Five Different Educational Tasks"
8. Bernell J. Edwards and Vernon S. Gerlach, "The Effects of the Summation of Audiovisual and Textual Instructional Cues Upon Student Achievement"
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21. Terry L. Gibson, "Effect Upon Learning of Student Knowledge and Acceptance of Behavioral Objectives"

Abstract No. 1 Williams

THE ROLE OF THEORY AND STUDENT CHARACTERISTICS IN LEARNING THE OPERATION OF AUDIOVISUAL EQUIPMENT

Mary Lois Williams
Assistant Professor
Department of Graduate Studies
in Education
Indiana State University
Terre Haute, Indiana 47809

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Purpose

This study was designed to test the feasibility of incorporating audio and projection theory in the instruction of basic pieces of audiovisual equipment, to compare the methods of self-instruction using programed materials and lecture/demonstration in the teaching of theory and their effect upon learning equipment operation, and to determine whether the knowledge of selected academic, aptitudinal, and personal variables enhance the predictability of successful performance.

Procedure

The programed materials used in the experiment were developed by the writer. Four separately-bound units covering the theory and operation of the 8mm cartridge projector, record player, tape recorder, slide/filmstrip projector, and 16mm motion picture projector were included. The programs were field tested and revised prior to the study.

The criterion instruments included both a written examination to test the comprehension of important concepts and a performance examination to evaluate proficiency in the operation of the five pieces of equipment.

The sample used was ninety students enrolled in the experimenter's sections of an introductory audiovisual course for elementary teacher education majors at Indiana State University.

The study was conducted during a three-week period. Subjects were randomly assigned to one of three treatment groups. Subjects assigned to Treatment A, the control condition, reported to the classroom at regular class times. The instructor followed the exact progression of introducing equipment as encountered by subjects in Treatments B and C. Content varied only in that subjects in Treatment A were not exposed to audio and projection theory. All instruction followed the lecture/demonstration format.

Subjects in Treatment B, an experimental condition, also met in the same classroom as subjects from Treatment A for lecture/demonstration sessions. However, this group was exposed to one and one-half hour presentation on audio and projection theory. The same instructor taught both sections.

Subjects assigned to Treatment C, an experimental condition, reported on self-established schedules to the Media Laboratory by appointment to work on each of the four programed units by means of self-instruction. Practice in all

three conditions was self-initiated, with assistance only in the event of machine problems. Time devoted to the treatments was identical and the facilities used were equivalent in size, appearance, fixtures, equipment, and corresponding materials.

Results

On the written criterion examination, the differences between means A and B and A and C were both significant at the .01 level. On the proficiency examination the difference between means of Treatments A and C was significant at the .05 level. No significant differences were found between the means of Treatments A and B and B and C, although significance was approached at the .05 level between means A and B.

The implications of these findings dispel the likelihood that method of instruction alone is responsible for effects upon performance on either criterion instrument. However, the inclusion of theory seems to be reflected in higher performance on both tests.

Of the academic, aptitudinal,and personal variables tested (sex, employment, class load, Grade Point Average, Scholastic Aptitude Test scores - verbal and quantitative, O'Conner Finger Dexterity Test scores), Grade Point Average and the SAT-quantitative measures appeared as useful predictors to performance on both tests. The SAT-verbal measure was significant to performance on the written test alone.

Discussion

Little evidence is found to support the contention that successful equipment operation is based sheerly upon mechanical movements. The cognition of basic principles related to understanding the composition and physical features of materials and the functioning of equipment parts seems to facilitate performance.

Abstract No. 2 Brecke and Gerlach

THE EFFECT OF INSTRUCTIONAL CUES ON LEARNING IN A SIMULATED ENVIRONMENT

Fritz H. Brecke
Dept. of Educational Technology
Arizona State University
Tempe, Arizona 85281

Vernon S. Gerlach
Professor of Education and Director
Instructional Systems, University of Minnesota
Minneapolis, Minn. 55455

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Eleven USAF student pilots were subjected to three levels of cognitive pretraining for a standard, representative instrument flight maneuver (Vertical S-A). Pretraining information, administered in accordance with USAF instructional procedures, differed in terms of instructional cues. Group A: Currently operational cues; Group B: cues developed on the basis of a semi-algorithmic procedure (Maneuver Analysis); Group C: maneuver objective only, no cues. Immediately following pretraining Ss performed eight successive trials of the maneuver in a flight simulator for the Cessna T-37 aircraft. Performance on eight flight parameters was automatically recorded in 2-sec. intervals. Maneuver completion time was significantly higher for Group B which also exhibited a markedly more consistent performance over trials. Learning rates and error scores did not differ significantly.

The findings cast doubt on the assumptions underlying current instructional practice. This study and further research currently underway are discussed in the light of information theory and verbal mediation theory.

TEAM TEACHING: STUDENT PERCEPTIONS OF TWO CONTRASTING MODELS

John E. Splaine
Assistant Professor
David J. Bowering
Doctoral Student
College of Education
Department of Administration
Supervision and Curriculum
University of Maryland
College Park, Maryland 20742

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Purpose

This study contrasted two different organizational models of team teaching in a course in "The Utilization of Educational Media" at the University of Maryland. The objective was to determine which model students perceived to be more effective in promoting their learning. Student-perceptions regarding student-teacher rapport and the cohesion of the course content were also examined.

Rationale

Both authors have taught the basic course in Educational Media in the past and have found that the course demands a variety of teacher competencies because of its eclectic nature. Therefore, the researchers concluded that the course would be best taught by a teaching team. But what kind of teaching team?

Although there is a plethora of research on team teaching there is little that examines the effect of various team organizational patterns on instructional effectiveness. The authors believe they could add to the present research on instructional effectiveness through an experimental examination of different team models.

Procedures

Two different team teaching models were utilized in teaching the same material to two groups of students in the course at the University of Maryland. In Model 1, the team leader was clearly identified. His function was to coordinate and follow-up the instruction of the other team members who were brought when their special competencies were needed. The team leader was involved with each team member individually in the planning stage and was in the class during the instructional stage.

In Model 2, all six team members were involved as a group in the initial planning stage. During the implementation of instruction only the persons involved in the actual act of instructing were in the classroom. No one person was formally identified as the team leader. Model 1 was used with two groups of students of size 39 and 38. Model 2 was used with a third group of 22 students.

The instrument used to collect student perceptions was a Likert-type questionnaire. The questionnaire was verbally administered to three groups.

A Likert-type questionnaire was used to gather student perception regarding: a) the effectiveness of the team teaching model compared to their experiences with traditional instruction, b) the student-teacher rapport-generated, and c) the organization of the course material.

Results

Comparisons were made between the groups and between the two models. Correlations and (non-parametric) analysis of variance technique were used. Significant levels are reported in the paper.

Conclusions

1. Team teaching was perceived by students as being at least as effective in promoting their learning as the single teacher approach.

2. Students strongly preferred a team under the explicit and recognizable control and direction of a single team leader. Student-teacher rapport was significantly higher and students perceived themselves as learning more effectively. Students also perceived a well-organized, cohesive sequence of instruction, under this model.

THE RELATIONSHIP BETWEEN STUDENT ACHIEVEMENT AND MANIPULATED LEARNING ENVIRONMENTS

Keith Collins, Ph.D.
Assistant Professor
Department of Continuing Medical Education
Howard L. Stone, Ph.D.
Associate Professor
Department of Continuing Medical Education
Wayne I. De Master, M.S.
Research Assistant
Baccalaureate Nursing Curriculum
Harry Knopke, M.S.
Research Assistant
Baccalaureate Nursing Curriculum
University of Wisconsin
Madison, Wisconsin

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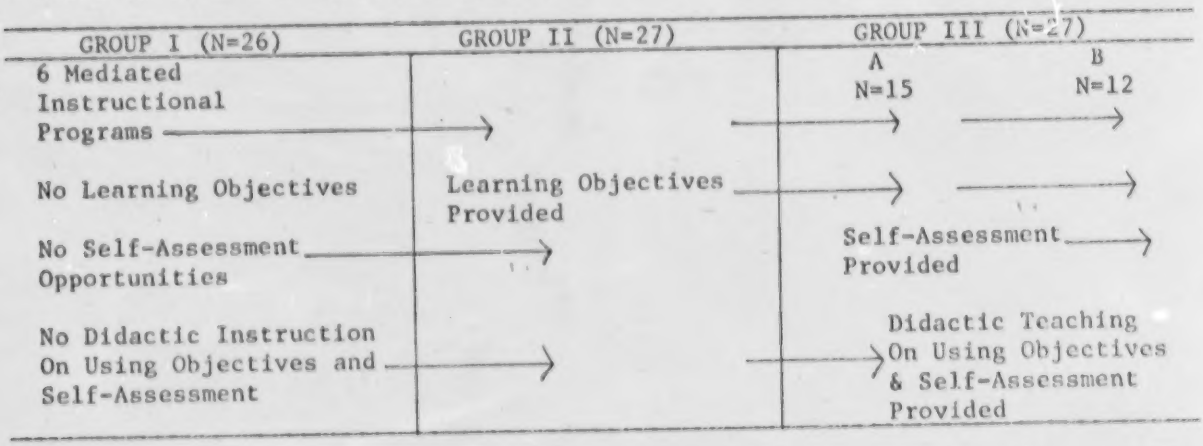
This study is concerned with the manipulation of learning environments and teaching methodologies as a means of improving the level of student achievement in a second year instructional program in a baccalaureate nursing degree program at the University of Wisconsin. It was hypothesized that there would be significant differences in the level of student achievement as a result of manipulating the use of mediated instructional programs, learning objectives, self-assessment opportunities, and didactic instruction.

Methodology of the Study

This study was conducted with a class of 80 second year nursing students enrolled in a course entitled, "Introduction to Secondary Health Care". Utilizing a table of random numbers, the class was divided into three groups.



1) The instructional media consisted of six separate programs; three slidetape casettes and three film-loops, 2) A set of learning objectives and

self-assessment exams were developed for each of the six programs, 3) A didactic presentation to 15 students in Group III instructed students on utilizing objectives and self-assessment opportunities in an instructional program.

The students were asked to complete this portion of the program in a four week period. The students were given pre-and post-tests developed by by faculty peer groups who were not teaching in the course, with the questions being related to the specific learning objectives identified for each of the mediated programs.

Results and Conclusion

Although there were no significant differences between group means on the pre- and post-tests, Group III-A which received objectives, self-assessment tests, and didactic instruction and Group III-B which received objectives and self-assessment tests showed the greatest gain in mean score between the pre- and post-tests: +15.25 and +18.33 respectively, as compared to +14.69 and +13.13 of Groups I and II.

The study does provide a method for attempting to determine if providing statements of learning objectives and opportunities for self-assessment are worthwhile activities in terms of enhancing student achievement.

Abstract No. 5 Bond

A REVIEW OF RECENT FINDINGS ABOUT STUDENT RESPONSES TO FILMS

Jack H. Bond, Ed.D.
Assistant Director
Computer Based Project
410 East Willow
Prescott School
Syracuse, New York 13203

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for the Research Paper Presentations
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The availability of instructional film and video tape presentations in several forms, such as B/W and color or captioned and non-captioned, has lead to the question of the difference these and other formats may have on learners, particularly special education students.

An intensive analysis of the 600 films in Media Services and Captioned Films Depositories (USOE, BEH) with Educable Mentally Handicapped (EMH) children has indicated some findings relevant to instructional uses of films and the production of these presentations.

Method

Each film was subjected to a panel to ascribe objectives and content criterion items. When shown to a class, these items were administered and measures of attention and an individual interview checklist were obtained. These responses for each of the films were summarized and stored in a data base. The film characteristics of color or black-white, length, captioned or non-captioned, academic subject area, copyright, etc. were identified as film variables to be compared with student variables of academic level, age, mental abilities, and scores on the cognitive instrument.

Color Versus Black-White

An investigation into the characteristics of color and black and white films was conducted by regrouping the data base obtained from evaluating the library of 600 instructional films. A sample of 30 color and 30 black and white films was chosen at random for a posthoc analysis of the posttest scores on the cognitive content received from 300 educable mentally handicapped children in an urban school district.

A two-way analysis of variance was employed using pretest scores and posttest scores as one dimension and color or black-white as the second dimension. The resulting analysis indicated no significant differences attributable to the film characteristics (color-black/white), $F=0.6$, and significant differences at $p=.05$ between pre and post test scores, $F=8.8$. The attention observations indicate a slightly higher, but not significant, attention to color films in terms of percent of audience watching.

Captioned Versus Non-Captioned

A second analysis was performed using the same 600 film library and selecting 20 non-captioned and 20 captioned films and performing a posthoc analysis on the posttest data from the same 300 EMH children. The same model was used for the analysis of the second data set substituting caption and non-caption for the second dimension. The resulting F values indicated again a significant difference between pre and post tests and no significant difference between captioned and non-captioned films on cognitive measures. A suprising finding was that the attention profile for

non-captioned versions of the same film was significantly higher than the captioned versions using a chi-square statistic to compare the two profiles.

These findings seem to suggest that the academic learning from a film is not appreciably enhanced by the dimension of color or the addition of captions for EMH hearing and seeing viewers. The generally higher cost of color and/or captioned films does not seem to be justified on the basis of academic learning alone. The aesthetic and attention values of color may be important areas that justify the extra expense. Captioned versions seem to cause less attention from hearing viewers indicating an information or stimulus "overload".

Abstract No. 6 Tuttle and Olsen

THE EFFECT OF A GRAPHIC AND EXPLICIT REPRESENTATION ON THE ACQUISITION OF SENTENCE GENERATION SKILLS IN A FOREIGN LANGUAGE

David M. Tuttle
Research Associate
W-160 STAD
Brigham Young University
Provo, UT 84602

Roydon J. Olsen
Staff Linguist
Language Training Mission
Provo, UT 84602

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Acquiring sentences generating skills in a foreign language is essentially a problem in understanding the structure of the language. But language is abstract and abstractions are hard to teach. Language speakers already possess a considerable amount of knowledge about grammar albeit intuitive and non-explicit. By reducing these abstractions to graphic illustrations and making the grammatical relations explicit, this knowledge becomes a pedagogically descriptive and powerful tool for learning a new language. The more economical and powerful the representation, the greater the transfer. The effect of a graphic and explicit representation of grammatical relationships in natural language is investigated in this study, this being the first in a series of studies to determine the applicational effectiveness of junction grammar (Lytle, 1973) in particular, the structures generated by this grammar. It is hypothesized that the use of these structures provides a psychologically powerful construct for facilitating this transfer in foreign language instruction.

Junction grammar representations consist of intersecting branching tree diagrams, colloquially called language trees, and are generated directly (as opposed to transformations) from three distinct operations or rules. These operations reflect intuitive psychological processes that are understood by all speakers. Simply defined, conjunction is the adding together of like elements in a sentence, most commonly accomplished with commas and "ands". Adjunction is the operation asserting a new relationship between sets such as between a subject and its predicate in a sentence, between a verb and its object in a predicate, and between a preposition and its object in a prepositional phrase. Subjunction is roughly equivalent to the traditional concept of modification, which operation relates elements 1) in restrictive, or non-restrictive modifications or 2) through derivation or recategorization.

Materials produced for this study include a 25-minute videotape that discusses levels of language, junction operators, and examples of grammatical structures; the videotape is reinforced by two booklets, one for English and the other for Spanish, that provide practice in generating statements using language trees.

Data show significant (at the .01 level) differences in the sentence-generation performance of experimental subjects who consistently produced more grammatical structures, fewer errors and more complex structural operations than control subjects. Experimental subjects generated nearly two and one half times as many complex grammatical structures as subjects not exposed to language trees, making only one structural error to every six committed by control subjects. Of interest to language teachers is the fact that actual exposure to language trees in the experimental groups averaged only five hours in approximately seventy-two hours of instruction, or just under 7% of total instruction time.

These results seem to indicate that language trees make explicit what is known intuitively and facilitate analysis of the target language for similar and dissimilar structures by enhancing the ability to map native language structures on to the target language. This seems to have the effect of reducing the information processing load considerably. Subjects do not have to generate a completely novel structure for the target language and attention focuses primarily on the structures that differ from the native language.

Abstract No. 7 Parkhurst

ASSESSING THE EFFECTIVENESS OF SELF-PACED, VISUALIZED INSTRUCTION; A Multifactor Analysis on Five Different Educational Tasks

Perrin E. Parkhurst
Pennsylvania State University
209 Mitchell Instructional Services Bldg.
University Park, Pennsylvania 16802

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and Reproduced for Distribution
at the Convention
by the ERIC Clearinghouse
on Information Resources
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Purpose

The purpose of this study was to investigate the optimum combination of selected media presentational methods and an individual difference variable for self-paced (independent study) visualized instruction on several different educational tasks.

Independent variables were: 1) a media organization variable; 2) a visual realism variable; and 3) an individual difference variable. The dependent measure was performance on five criterion tests, each designed to simulate a different level of educational objective.

Rationale

When designers of mediated software are assembling that combination of media which they believe to be effective, it is widely contended that they do so mostly on the basis of intuition, feeling, or some other visceral basis. Few institutions or commercial production companies have reported any sound empirical data upon which to match: 1) type of individual, 2) type of educational task, 3) structure (internal or external pacing) of instructional material, 4) type of visual accompanying the instructional materials (if visuals are to be used), or 5) the particular method of combining media used (audiotapes, booklets, etc.).

Individual differences in many dimensions must be taken seriously if instructional technology is to be properly applied. This challenge will necessitate that educators designing mediated instructional packages view learning from many perspectives.

Procedures

A 3 X 4 X 3 factorial design with 5 levels of a repeated measure was used. in Lindquist's notation, it may be represented as: RS_n in $[A_3\ @B_4\ @C_3]@T_5$.

The three levels of factor A were: 1) programmed booklets with periodic review questions and answers after approximately every 10 frames; 2) same as 1 with additional questions and answers after each frame; 3) same as 2 with all printed instructional material being simultaneously presented on audiotape.

The four levels of factor B were: 1) no visuals; 2) line drawings, 3) detailed shaded drawings, 4) realistic pictures of the object.

The three levels of factor C were: 1) high, 2) medium, and 3) low, based on reading comprehension.

The five levels of the repeated measure were: 1) a drawing test; 2) an identification test; 3) a terminology test; 4) a comprehension test; and 5) a total criterion score (above four tests combined). All criterion scores were standardized to a "T" score; i.e., a $\bar{X}$ of 50 and a s.d. of 10, prior to entering them into the ANOVA.

S's (332) were students enrolled in a basic Instructional Media course within the college of education at Penn State University. They were given the 1973 Iowa Silent Reading Test and then randomly assigned to treatment levels of

factors A and B. A post hoc randomization procedure was used on the individual difference variable (reading comprehension). Cells were adjusted to attain proportionality. Analysis of variance was conducted both on the immediate posttest and 4 week delayed posttest.

Results

Of the 15 F-ratios tested, the following results were obtained; on the immediate posttest, four were significant between the .05 and .01 levels; on the delayed posttest, three were significant at the .01 level.

Conclusion

For immediate posttest results, the statistical interaction between factors B (visual realism) and C (reading comprehension) was significantly different ($p<.05$) at each level of the dependent variable. This tends to indicate that student achievement on different educational tasks is affected both by the type of visual accompanying the instruction and the level of reading comprehension.

For delayed posttest results, the statistical interaction between factors A (method of presentation) and C (reading comprehension) was significantly different ($p<.01$) at each level of the dependent variable. This appears to indicate that student achievement on different educational tasks is affected both by the method of presenting the content information and the level of reading comprehension.

THE EFFECTS OF THE SUMMATION OF AUDIOVISUAL AND TEXTUAL INSTRUCTIONAL CUES UPON STUDENT ACHIEVEMENT

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Bernell J. Edwards*
Television Production Specialist
Human Resources Laboratory
Williams AFB, AZ 85224

Vernon S. Gerlach*
College of Education
University of Minnesota
Minneapolis, Minnesota

*The research was performed while the authors were at Arizona State University, Tempe, Arizona

The objective of this study was to determine whether instructional cues presented to the learner as variations of audiovisual and textual information including a cue summation condition (combined textual, pictorial, and auditory cues) can facilitate the achievement of precise instructional objectives.

One hundred twelve education students enrolled in a mental retardation class at Arizona State University were randomly assigned to one of eight treatment variations of cues imbedded within a self-instructional unit on cerebral palsy and were given a posttest immediately after instruction.

Students receiving textual-only cues scored significantly higher ($p < .01$) on the posttest than did students receiving auditory cues only. Students receiving the cue summation condition of cues did not score significantly higher than did students receiving other combinations of cues.

Abstract No. 9 Bullard

RESPONSES IN THE AFFECTIVE DOMAIN OF COLLEGE-AGE LEARNERS TO TWO LEVELS OF QUALITY OF GRAPHIC INSTRUCTIONAL STIMULI

John R. Bullard
Assistant Professor and Coordinator
Educational Media
University of Iowa
W-14 East Hall
Iowa City, IA 52242

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The purpose of the study was to determine the effect of two variations of technical quality of static two-dimensional graphics on: a)willingness to receive, as demonstrated by selected attention, b)acquiescence to respond, c)willingness to respond, d)satisfaction in response, and e)judgment of source credibility. An additional objective was to provide additional evidence about the relationship of slickness to learning.

The contribution of high technical quality art and reproduction techniques to the effectiveness of graphics has not been established; they may be a costly extravagance. Commercial producers seem to believe that slickness is a significant factor. Evidence of this would have implications for teaching and for the introduction of principles of selecting and producing graphics in teacher education curricula. If slickness does not enhance learning, and educators are made aware of this, there should be increased use of "quick and dirty" graphics whenever graphics are appropriate. The resultant savings could be utilized for other educational needs. If students respond differently to rough "teacher-made" graphics, despite the fact that they could learn as much from them, then the savings may result in reduced learning or a negative attitude toward the subject or the experience.

As a necessary precursor to the study, a conceptual scheme for the analysis of graphic materials which might be useful to researchers in graphic design was developed to facilitate explication of variables which affect technical quality (slickness).

Two graphic versions of a fictitious instrument (with nomenclature) were randomly distributed as handouts to three intact undergraduate classes for six experiments.

Ss in group one studied the handouts for 5 minutes, took a written test to measure immediate recall of specific facts (Experiment 1), and then completed a semantic differential form designed to measure satisfaction in response (Experiment 5).

Ss in another group (Experiment 2) were asked to rank a packet graphics (identical except for experimental stimuli) in preferential order as an indication of willingness to receive based on a requirement that they write an essay concerning one of the graphics. These Ss were then asked to make judgments about the credibility of the assumed source of the experimental graphic on a semantic differential form, under the guise of measuring student perceptual skills (Experiment 6).

Acquiescence to respond (Experiment 3) was measured by the amount of time the third group of Ss spent studying the graphic when told to learn the information to

the best of their ability. Willingness to respond (Experiment 3) was measured by the number and variety of conditions these Ss would volunteer as Ss for future studies using the same handouts.

Although all except one of the experimental treatments produced results in the predicted direction, only willingness to receive was significantly affected by slickness. Significantly more Ss who had studied the slick graphic stayed to hear an explanation of the study. This provided evidence suggesting that slickness may affect higher-order affective responses. The slickness of instructional graphics which are studied for less than 15 minutes appears to have little effect on the factual recall, judgment of source credibility, or selected affective response. Research is needed using more extensive learning tasks over longer time periods.

Abstract No. 10 Essex

COPYRIGHT KNOWLEDGE AND OBSERVANCE IN HIGHER EDUCATION

Allan B. Essex
Educational Communications Specialist
Bureau of Audio-Visual Instruction
University of Wisconsin
Madison, Wisconsin 53706

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Purpose

The purpose of this research is to explore the general level of copyright opinions and observance among faculty, librarians and media specialists in relation to some of their common uses of educational media in college and university instruction.

Procedures

From a random selection of four-year colleges and universities in the U.S., listed in the Carnegie Commission Study of Higher Education, 100 colleges and universities were solicited to participate in the survey. The 100 participating institutions were each mailed five questionnaires; three for instruction faculty, one for an educational media specialist, and one for a library director. Procedures were stipulated to ensure minimum selection bias.

The 80-item questionnaire consisted of twenty common educational practices devised to represent eleven different copyrighted media and eight different copying media. For each of the twenty practices, respondents were asked first, their opinion of copyright legality (1 to 4 scale) and second, their degree of insistence to continue the practice (also a 1 to 4 scale). The questionnaire concluded with a 40-item section for biographical data from each respondent.

Results

The data processing and their interpretation are aimed at answering the following questions:

1) To which media do educators assign the most, and the least, deviant copyright opinions and observances?
2) Which groups of educators, from what quality of institution, assign the most, and the least, deviant scores on copyright opinions and observances?
3) What effect does personal authorship have on educators' opinions and observances?
4) What other biographical factors have significant effect on educators' copyright opinions and observances?
5) To what extent are educators consistent in similar educational situations, in their copyright opinions and observances?
6) To what extent do the educators in this sample correlate biographically with the educators sampled in the Carnegie Commission Study of Higher Education? (1971)

Abstract No. 11 Bullough and Brumbaugh

THE DEVELOPMENT OF A COMPETENCY-BASED MODEL FOR USE IN INSTRUCTIONAL TECHNOLOGY

Robert V. Bullough, Sr.
Assistant Professor
W. Donald Brumbaugh
Professor
Bennion Hall, University of Utah
Salt Lake City, Utah 84112

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Purpose

The purpose of this research was to develop a functional model around which a competency-based program in instructional technology could be structured.

Procedures

Several sources of input were utilized in the development of the two-part model including the work of Syracuse University and the Oregon System of Higher Education, the definitive model of Silber, and McCleary's CBC Model.

A campus-based team working on a competency-oriented program for school administrators had found, as had the instructional technology group, that no functional definition of competency existed. The team, Larry Gale and Gaston Pol, discarded the use of "competency" altogether and formulated a manageable rationale which was based not on competencies, but on competences. They developed the idea of Areas of Competence. Using this rationale, the instructional technology model was structured to include:

AREA OF COMPETENCE

PERFORMANCE

PERFORMANCE REQUIREMENTS

COMPONENTS OF PERFORMANCE
Knowledge, Skills, Ability, Capability, Judgment

Precise performance requirements and performance components were formulated which were based on several sources of information. Input was obtained 1) from practitioners in the field through doctoral research; 2) from members of the staff; and later 3) from state personnel and the staffs of other institutions of Higher Learning in the state.

The second part of the model, termed the "Model of Mastery" was next devised. It consisted of columns labeled "description of stimulus," "act or response," "product," "effectiveness," "cost-difficulty," and "choice". These instruments were completed for each instructional situation, for each of the areas, and at each of the levels.

This exercise resulted in the selection of the single best teaching-learning alternative for a given situation from an array of alternatives.

With alternatives defined, the development of strategies could proceed.

Results

Interest at the state level has resulted in the assignment of a grant to the University for the development and field-testing of modularized instruments which will be used to assess the competences of candidates for the State Media Endorsement. First efforts at subsuming the behaviorally-based requirements listed in the state publication, Requirements for Instructional Media Endorsements, under the "Components of Performance" category of the model have proved to be singularly successful. Initial attempts to identify alternate teaching-assessment strategies using the "Model of Mastery" have proved to be highly satisfactory.

The development of prototype learning-assessment packages has been initiated, and a tentative time-line established. It is anticipated that field-testing of the prototypes will occur during the upcoming academic year.

PERFORMANCE FEEDBACK IN COMPUTER ASSISTED INSTRUCTION

Dr. James L. Eubanks
Assistant Professor of
Educational Technology
Dr. Norman C. Higgins
Associate Professor of
Educational Technology
Box FLS, College of Education
Arizona State University
Tempe, Arizona 85281

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Purpose

The present research sought to determine the effects of providing cumulative response records on learner's error rate and time to complete a computer administered instructional program.

Rationale

Studies of feedback in programmed instruction have seldom demonstrated any facilitating effect of response confirmation on learner achievement. Several of these studies suggest that learners may attend less to instructional materials when feedback in the form of knowledge of correct response (KCR) follows each frame in a program. Attempts to control the learner's observing behavior with "timeout" for incorrect responses or advancement through the program contingent upon correct responding have not been successful.

Providing the learner with a cumulative record of his performance during a lesson is less aversive than previously used response contingencies and should reinforce learner observing behavior, thus reducing errors during instruction.

Procedures

Twenty one students enrolled in an introductory psychology course worked through a set of The Analysis of Behavior by J. Holland and B.F. Skinner. The lesson had been modified for computer administration. The subjects were randomly assigned to one of three feedback procedures in which KCR was presented separately from either the preceding or following frame.

In the first procedure the computer printed only the correct response after the learner had responded. In the second procedure the learners received one point for each correct response emitted during the lesson. Under this second condition the computer printed the learner's cumulative point total and the correct response after each response. The third condition employed a response cost contingency under which the learner received one point for each correct response and lost one point for each incorrect response. The cumulative point total and the correct response were printed after each response as in procedure two.

Results

Means for program errors and time required for program completion under the three feedback procedures employed are presented. An analysis of variance indicated no significant differences on corrected error scores (total errors minus typographical errors, incorrect grammar, and spelling mistakes), $F=.984$, $p<.40$ or on total time, $F=3.38$, $p<.30$.

Discussion

The failure of the present study to find a significant difference in learner performance due to differential response consequences might be attributed to several factors. These factors include: failure of the computer to accept plausible learner responses, the length of the lesson, and the time required to process the learner's responses and provide feedback. These factors, their effects, and control in future studies of feedback in computer administered instruction are discussed extensively.

Abstract No. 13 Caffarella

THE COST-EFFECTIVENESS OF INSTRUCTIONAL TECHNOLOGY: A PROPOSITIONAL INVENTORY OF THE LITERATURE

Edward P. Caffarella, Ph.D.
Director of the Instructional Systems Center and Assistant Professor of Education
14 Shibles Hall
College of Education
University of Maine at Orono
Orono, Maine 04473

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Purpose

The purpose of this study was to formulate a list of propositions pertaining to the cost-effectiveness of instructional technology.

Rationale

Colleges and universities across the country are currently facing financial problems. Institutions are meeting these problems primarily by utilizing short-range, stop-gap solutions. Among those being utilized now are the following: 1) delay of non-essential building repairs, 2) elimination of non-productive programs, 3) elimination of faculty positions, 4) decrease in the budgets of all departments, and 5) postponement of faculty raises.

Higher education must find long-range solutions to the financial problems; otherwise it will continually need to find new short-range solutions for financial problems. It appears that if the long-range solution is to be a real solution, then the current structure of higher education, particularly the organization of instruction, must change.

Many leading educators have been suggesting instructional technology as a means by which institutions of higher education can meet, at least in part, the current financial dilemma. Through the use of instructional technology higher education can become less labor-intensive and more capital-intensive. Thus, it will be possible to increase the productivity of higher education and simultaneously to increase the cost-effectiveness of instructional technology.

Procedures

The methodology used, the propositional inventory research design which has been used in a number of sociological studies, consists of collecting, analyzing, and synthesizing existing studies that deal with the subject. The first step in the methodology was the development of a bibliography of all studies that measured the cost-effectiveness of instructional technology. The initial bibliography consisted of four hundred and twenty-nine references. Of this number approximately three hundred were evaluated in terms of two criteria. The first criterion was that the study must deal with the cost-effectiveness of instructional technology. The second criterion was that the study had to be either an empirical study or its findings had to be supported with quantative

data. From the thirty-two studies that met these criteria sixteen propositions were formulated which encompass the findings for these studies.

Results

The propositional inventory resulted in sixteen propositions which deal with the cost-effectiveness of the following concepts: class size for closed-circuit television; class size for open circuit broadcast; airborne television; shared broadcast facilities; local ownership of sixteen millimeter films; amplified telephone; production of instructional materials; savings in student time; utilization of facilities; increase of student/faculty ratio; utilization of instructional technology to reduce instructional costs; decrease in cost per student when instructional technology is employed; decrease in cost when materials are reused; expanding the availability of instruction to new students; enriching the curriculum.

Two examples of the propostions are:

Proposition Number 1A. The cost of providing instruction through use of one instructor lecturing to thirty students will be less than the cost of utilizing closed-circuit television when the total course size is less than two hundred students.

Proposition Number 12. As the number of students increases the costs per student decreases when instructional technology is utilized.

The complete paper includes a presentation and discussion of the sixteen propositions.

Conclusions

The conclusions for this study are the sixteen propositions. There is however another conclusion which is important.

The current quantity and quality of research on the cost-effectiveness of instructional technology is low. Since only thirty-two out of approximately three hundred studies reviewed met the established criteria, it is evident that even though there has been a proliferation of writings on the cost-effectiveness of instructional technology there has been very little research on the subject. Because of the small quantity and low quality of the research there is a need for additional empirical and data-based research regarding the cost-effectiveness of instructional technology.

Abstract No. 14 Spangenberg

IMPLICATIONS OF CARREL INSTRUCTION ON EMPHASES IN EVALUATION

Ronald W. Spangenberg
Training Research Specialist
Media Design and Evaluation Branch
AFHRL/TT
Lowry AFB CO 80230

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The use of carrel instruction will cause increased emphasis in three areas. These three areas are: quality control (student performance), module validation, and learning effectiveness.

One of the implications for testing in the area of learning effectiveness will be an increase in the development and use of diagnostic tests. Diagnostic tests will be increasingly used to direct the learning of the student. The student, the instructor, or the program will use diagnostic tests to select modules for optimal paths of learning.

Learning module validation will become increasingly objective. Modules will be systematically evaluated to insure optimal learning. The area of module validation will probably exercise the innovativeness and creativeness of evaluators to the greatest extent. Experimental approaches to module design and evaluation which have been field tested will be shown.

Quality control of the criterion performances will be increasingly emphasized. Student sampling and extensive student performance tests can insure the objectivity and validity of student performance checks. Our technology can now provide adequate simulation of many job environments. Computer technology is being integrated into these simulations. The use of synthetic performance tests should increase because of their potential economy. However, their reliability, validity, and objectivity must be established through actual performance testing. An illustration shows an experiment comparing tests using pictures with tests using performances on equipment.

The use of carrel instruction appears as an opportunity for developers and evaluators of instruction to increase learning effectiveness, to systematically validate learning modules, and to provide better quality control of student performance.

Abstract No. 15 Gilman

PERSUASIVE RESEARCH AS A METHODOLOGY FOR PROGRESS IN INSTRUCTIONAL TECHNOLOGY THEORY

David Alan Gilman
Professor of Education
and Coordinator of Research
and Measurement
Graduate Department of Education
Indiana State University
Terre Haute, Indiana

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Purpose

The purposes of this paper are to 1) trace the development of persuasive research as research methodology, 2) to demonstrate the importance of persuasive research to the development of theory in instructional technology, and 3) to outline the merits of utilizing persuasive research in education.

Rationale

A variety of educational research often practiced, but seldom talked about is persuasive research. Persuasive research can be described as an in depth attempt to locate documentary support for the investigator's hypothesis concerning the problem he is studying. Succinctly stated, persuasive research uses investigation as a tool in an attempt to affect attitudes.

Introductory research instruction has long emphasized the advantages of presenting all relevant evidence, being dispassionate in inquiry, being emotionally disinterested in the problem, and reporting all evidence objectively.

However, research that is conducted in a deliberate attempt to support a hypothesis can be the most powerful of all studies since it produces a clear cut endorsement of one theoretical position.

Particularly in the field of instructional technology, theory has benefitted greatly by persuasive research while objective empirical research is not always able to leave the reader with a clear cut endorsement of any theoretical position.

Procedures

A thorough documentary study has been conducted concerning the history and logic of persuasive research.

Results

Persuasive research is conducted in all fields of scientific endeavor and is epitomized by legal research, newspaper editorial research, and product research in advertising.

Although persuasive research does not present all sides of a controversy, it has distinct advantages since 1) it enables researchers to get ideas out in the open, 2) it enables the investigator to produce a clear-cut endorsement of one theoretical position, and 3) it is more convincing to the typical research consumer.

Such innovations as programmed instruction, computer-assisted instruction, and team teaching have been furthered by publications of persuasive research articles.

Conclusions

The field of instructional technology can benefit greatly from the use of persuasive research.

Persuasive research is subject to ethical practices, criticism, and honesty, as are all forms of research. However, to insist that students of educational research be objective and ambivalent in every investigation is not teaching research the way research is actually practiced and can seriously impair the development of educational theory.

Abstract No. 16 Williamson

A CRITICAL LOOK AT CABLE TV FRANCHISING IN A RURAL STATE- SOUTH DAKOTA

Rick P. Williamson
Media Director
College of the Virgin Islands
St. Thomas, U.S. Virgin Islands 00801

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The growth of cable television in small communities has forced many community leaders to regulate and deal with cable communications on a level totally unfamiliar to them. Although there does not seem to be a lack of information available, many of the publications are not applicable to rural situations. Due to this lack of information, consumers, educators, municipalities and state legislators in rural areas are seemingly unfamiliar with what has already occured in cable communications and what role communications may play in the future of rural communities. Through this lack of knowledge, many long term franchise agreements have been entered into by local governing bodies which, in most cases, do not serve in the public interest.

Recent federal regulations of cable television in the top 100 market have brought many of the problem areas of CATV franchising in check. However, the lack of regulations applicable to those cable operations below the top 100 market has, in the absence of state guidelines, left the complete job of franchising in the smaller communities up to local authorities.

To form a basis of information for rural franchise granting authorities, a study of existing franchises in South Dakota was conducted to evaluate the quality of present franchising practices.

Each city in South Dakota with a population of 2000 or more was contacted and asked to submit present cable regulations if franchises had been granted to cable operators. All cities responded and the twenty-three cities with cable franchises submitted copies of their cable franchises for study.

To evaluate each of the franchises, a chart of seventy-five areas thought to be critical in or common to South Dakota cable franchising was compiled and each franchise compared to this set of criteria. Franchises bearing similar characteristics and format were grouped together to facilitate catagorization and correlation between cities and cable operators. After determining how well each franchise met the criteria, the franchises were reviewed as a whole and recommendations were made in deficiency areas.

In these South Dakota communities, many critical areas of cable franchising have been either dealt with lightly or not dealt with at all. In South Dakota, as in other areas, the quality of service offered by a cable operator in many instances has a direct correlation with how much control is exerted over the franchisee by the community. This control can take many forms. Franchise duration, provisions for city ownership, public hearings, disclosure of records by franchisee, mapping of cable placement, service quality and facility inspection are a few of these controls. Communities must also keep abreast of other areas of control such as FCC influence on cable and copyright laws. The public should also be aware of how they can cooperate with the cable investor to promote local origination and advertising, improve educational services through cable installation and encourage development of expanded cable programming.

Limitations on a cable franchise regarding signal quality, channel capacity and territory covered should be studied closely as should consumer's rate structures, percentages paid to municipalities and bond requirements.

In summary, the franchises in South Dakota do not show the quality guidance needed to promote the vast potential of cable communications. The education of interested persons and lawmakers is the first step, to be followed by necessary guidance issued either at the state level or by municipalities to bring all the franchises to a point in development whereby the individual subscriber is the ultimate consideration.

Abstract No. 17 Tenpas, Higgins and Sullivan

THE EFFECTS OF PRACTICE AND INCENTIVE ON A PICTORIAL DISCRIMINATION TASK

Barbara G. Tenpas
College of Education
Arizona State University
Tempe, Arizona 85281
Dr. Norman C. Higgins
Dr. Howard J. Sullivan
Arizona State University

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The present study was conducted to investigate the individual and combined effects of incentive and practice on learner performance on an aircraft instrument comprehension task. To perform the task, Ss selected the picture of an aircraft in flight that most nearly corresponded to the readings on heading and altitude indicators.

This study was one of a series of studies being conducted to determine which variables are contributing to an effective self-instructional program. The program used in this study was systematically designed to include instructional cues, examples, prompted and unprompted practice items, feedback, and an incentive. In this study, practice and incentive were studied to determine their contributions to learner performance.

Two levels of incentive (Presence vs. absence) and two levels of practice (presence vs. absence) were manipulated in a 2X2 factorial design. The incentive offered for fast, correct responses on an aircraft instrument comprehension posttest consisted of quiz points in an Air Force ROTC course and an opportunity to "fly" a simulator of an airplane flying in formation. Practice was varied by deleting the practice items from the instructional booklets. The 48 Ss were assigned by class to the "incentive" or "no incentive" condition and then were randomly assigned within each class to the "practice" or "no practice" condition. The pretest scores for the four treatment groups were nearly identical. Each S completed the self-instructional program and the 36-item, multiple-choice posttest during one regularly scheduled class period.

F-ratios were calculated for posttest scores, posttest rates of responding, and instructional times. The results showed no significant differences in posttest scores that were attributable to practice, incentive, or their interaction. Learner rates of responding on the posttest, however, were significantly increased both by providing practice ($p<.001$) and by offering the incentive ($p<.001$). The time to complete the instructional program was significantly shorter under the incentive condition than under the no incentive condition ($p<.01$). The length of the instructional materials was approximately doubled by the addition of the practice items. Consequently, the instructional time of the practice group was significantly greater than the time for the no practice group ($p<.001$).

Although no significant differences in accuracy of responding resulted from the manipulation of the experimental variables, increases attributable to practice and to incentive were observed in the posttest rate of responding. The rate of responding is an important aspect of the instrument comprehension task in that it indicates the rate at which pilots read their control instruments. Future research about the conditions under which practice and incentive facilitate learning should enable instructional designers to more effectively incorporate these two variables into instructional programs.

AUDITORY-PERCEPTUAL LEARNING IN EDUCABLE MENTALLY RETARDED CHILDREN

Ernest N. Damianopoulos
Research Coordinator
Charles V. Mead , Director
Computer Based Project
Prescott School
410 East Willow
Syracuse, New York 13203

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The base level capability of primary level EMR children in identifying familiar sounds is relatively unknown. It was thus assumed that an empirical observation of EMR students' base level capability in recognizing commonly encountered environmental sounds was an appropriate goal. The purpose of the present study was to determine whether or not a filmstrip/record series called SIGHTS AND SOUNDS, an instructional media unit originally designated for hearing handicapped children, could behaviorally produce perceptual discrimination learning of familiar sounds in the city, house, farm, circus, orchestra, and at Christmas time in educable mentally retarded children (EMR) of primary school developmental level. Since the instrument evaluated incorporated an interesting application of the S-R concept of paired-associate learning, there was also considerable motivation to determine whether EMR children were susceptible to perceptual learning via this method.

Twelve EMR students were randomly selected from three primary schools in the Syracuse School District. Their ages ranged from 7-8 years and their IQ was within the range 54 to 75. The apparatus and materials of the present study consisted of the materials comprising SIGHTS AND SOUNDS, (Media Services and Captioned Films Branch, Bureau of Education for the Handicapped, Office of Education, Department of Health, Education, and Welfare, Washington, D.C. 20202) and the necessary auxiliary instruments, a filmstrip projector, and a record player. A Lindquist type VI, "Mixed" treatment design was employed in which the 6 filmstrips and the accompanying material was presented- to each S in pairs either in an experimental or in a control treatment format. There were 3 different sequences each requiring a separate group of S_s. The experimental treatment format included a pre-test, a treatment sequence, and a post-test. The control treatment was identical except for the substitution of an alternative treatment sequence. Preliminary observations were collected on four subjects and on two of the 6 media units of SIGHTS AND SOUNDS. In the experimentally treated media units the mean number of correct identifications, out of the 12 test sounds, was 50% in the pre-test and 71% in the post-test. The comparable scores in the units having received the control treatment were 54% in the pre-test and 50% in the post-test. These means were compared by a t-test for correlated means which indicated that the difference favoring the experimentally treated units was significant at X=.05-.10 level of probability.

Conclusion

These results indicate that the SIGHTS AND SOUNDS filmstrip instructional

media unit can indeed produce auditory perceptual-discriminative learning in EMR children at the primary school level of development.

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Abstract No. 19 Coldevin

THE DIFFERENTIAL EFFECTS OF SPACED, MASSED AND SUMMARY REVIEW TREATMENTS AS PRODUCTION STRATEGIES IN INSTRUCTIONAL TELEVISION PROGRAMMING

Dr. Gary O. Coldevin
Assistant Professor
Graduate Studies in Educational Tech.
Sir George Williams University
Montreal 107, Canada

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Purpose

While a considerable amount of research in ITV has been devoted to media comparative effectiveness studies, the examination of varied production techniques as they relate to information acquisition and attitude change is relatively limited. The primary focus of the present research was to examine the comparative effects of structuring review segments with spaced, massed and summary formats on information acquisition derived from a general information, documentary type of ITV production.

Rationale

This research differs markedly from other general studies in this area in that it is tested with television treatments rather than CAI, programmed instruction, film or slides. Further, an exhaustive review of ITV research supports only the general conclusion that repetition or review of an instructional sequence is more effective than a single exposure to a given unit. The most effective method of structuring a television program or series in terms of types of review segments under consideration has never been rigorously tested.

Procedures

Three television programs of 20 minutes duration each were produced, centering around the theme of forest fires. Each program was composed of three broad conceptual units of approximately six minutes each with a one minute "intro" and "extro". Each of the three conceptual units was divided into five sub-units in each program. The three conceptual units were then uniformly supported by either a spaced, massed or summary review treatment. Review treatments were rotated in each program to control for the possible influence of placement and content.

Both spaced and massed review segments were inserted at the end of each of the five sub-units, i.e., within the conceptual unit itself. Summary reviews were presented at the termination of the total conceptual unit. The spaced treatment consisted of an interval of five seconds between the normal iteration of review statements. All review segments were presented with a superimposition over a slide and voice-over narration. With the exception of review treatment formats, all production techniques, the narrator and narration were held constant for each program.

The sample population consisted of 12 grade seven classes drawn from schools in suburban Montreal. Four classes each were randomly assigned to one of the three experimental treatments; individual randomization was precluded through original random assignment of students to classes. All students viewed the programs and were tested during normal class periods. The final n consisted of

97 subjects for each treatment (N =291).

Cognitive acquisition was assessed through a post-test only design. A one way ANOVA with three levels was employed to determine the main effect of treatments with the Newman-Keuls test applied to mean comparison tests. Significant differences were tested at the .05 level of confidence.

Results

The spaced review treatment was found to be significantly more effective than either the massed or summary review formats toward inducing cognitive acquisition. No significant differences were detected between the massed and summary review treatments.

Conclusions

The results of this study indicate that the spaced review sequencing which implicitly allows for greater covert rehearsal and internalization of content may be the more effective format for structuring information reviews in an ITV program. No apparent advantage accrues through the selection of either a massed or summary format. The optimum length of the time interval between spacing of review statements, however, remains a complex variable requiring further investigation.

Abstract No. 20 Challis

THE EFFECT OF FIXED AND LEARNER SELECTED RATES OF COMPRESSED SPEECH IN AN AUDIO-TUTORIAL LEARNING ENVIRONMENT ON THE ACHIEVEMENT OF COLLEGE LEVEL STUDENTS

James Challis Ed.D.
Educational Consultant- Instructional Technology
2230 Donna Drive
Norman, Oklahoma 73069

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for the Research Paper Presentations
at the 1974 AECT Convention
in Atlantic City in March
and Reproduced for Distribution
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Purpose

The purpose of this study was 1) to determine if the use of compressed speech recordings in a college level learning environment affected achievement, 2) to assess student preference for compressed speech and, 3) to determine if school use of compressed speech could result in the savings of both learning time and learning space while remaining administratively practical.

Procedure

Ninety-six college junior and senior students, enrolled in an audio-tutorial portion of a required course, were randomly assigned to one of four groups: normal rate speech (120 WPM), 30 percent compression (174 WPM), 40% compression (200 WPM), and a choice of 20%, 25%, 30%, 40%, 50%, and 55% compression. Sixteen recorded units, with accompanying filmstrips, contained the material to be learned. Subjects wore headsets, and listened to the recordings while viewing the filmstrips in individual carrels. All subjects were unfamiliar with compressed speech, and no training in listening was given.

Results

Upon completion of ANOVA's, no significant difference in achievement was detected between the four groups; (P=.25). No significant difference in achievement between students with high grade point averages and students with low grade point averages was detected for any compression rate; (P=.05). There was no significant difference in achievement between students who spent the most time and students who spent the least time with the various compression rates. There was no interaction between achievement and amount of time spent; (P=.05). It was apparent that compressed speech did not engender excessive re-playing time. Subjects who used 30% compression realized a savings in time 17%, while those who used 40% compression saved 31% of the allocated time.

Affective Results

Tabulation of student responses to a Likert type questionnaire resulted in the following:

1. Ninety-one percent expressed a favorable attitude toward compressed speech as a primary mode for learning subject matter.
2. Ninety-four percent expressed a desire to take other college courses utilizing compressed speech.
3. One hundred percent indicated that they would use compressed speech for reviewing subject matter.
4. Ninety-seven percent felt that learner control over the compression rate was necessary or desirable for a most satisfactory learning experience.

Conclusions

1. College junior and senior students can learn the type of cognitive matter presented at least as well via compressed speech as by normal rate recordings.
2. Less total time is spent in audio-tutorial learning activities involving cognitive material when compressed speech is used in lieu of normal rate recordings.
3. Audio-tutorial units of the nature used in this investigation, presented via compressed speech, allow for more engagement with content, i.e. replay time, than normal rate recordings during a given period of time.
4. Grade point averages are a valid predictor for success in audio-tutorial learning of the nature and level provided in this investigation.
5. Compressed speech, used in an independent study environment, provides an additional measure of individualization regarding time.
6. No administrative or equipment problems arise solely due to the use of compressed speech in an audio-tutorial environment.
7. Compressed speech is an academically practical tool of learning.

Abstract No. 21 Gibson

EFFECT UPON LEARNING OF STUDENT KNOWLEDGE AND ACCEPTANCE OF BEHAVIORAL OBJECTIVES

Dr. Terry L. Gibson
Coordinator Program and
Staff Development
University of Wisconsin-Extension
432 N. Lake
Madison, Wisconsin 53706

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for the Research Paper Presentations
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Stanford University

Purpose

This study examines the relationship between the student's knowledge-acceptance of the instructional objectives and the amount of his learning as measured by tests (final examination and test of recall) on the objectives.

Rationale

Recent educational literature (Tyler, Bloom, Popham, Gagne, and Mager) places great emphasis on the importance of student knowledge of the behavioral objectives of a course and on their acceptance of those objectives as being relevant to their life and work situation.

Procedures

The fifty nine participants in this study were students enrolled in a graduate level course, "Principles of Vocational Technical Education" offered by the Educational Policy Studies Department of the University of Wisconsin-Madison. At the beginning of the first class period and at the last class session prior to the final examination, the students were given a list of thirty course objectives. They were then asked to rank their acceptance of each objective by placing six objectives in each of the five categories ranging from most acceptable to least acceptable.

The final examination and the test of recall given one month later consisted of a ninety item multiple choice test made up of three questions of each of the behavioral objectives of the course. Using the examination scores, a matrix of the ranked objectives and their related test items was developed for each student. Test scores for each of the five groups of objectives (least acceptable--most acceptable) were then individually ranked and summarized using the Kendall Coefficient of Concordance "W" corrected for ties in ranks.

Results

The findings of this study failed to reject null hypotheses based on the following variables:

1. Student ranking of behavioral objectives of the course as to their acceptance of the objectives a) at the beginning and b) at the termination of the course.
2. Student test scores on a) a final examination and b) test of recall one month after the final examination.

Conclusions

There is no statistically significant (.05 level) relationship between the student ranking of behavioral objectives of the course as to their acceptance at the beginning or at the termination of the course and their consequent

scores on a final examination or test of recall, students did as well on questions pertaining to objectives they felt were least acceptable as they did on questions pertaining to objectives they felt were most acceptable.

The final examination and the test of recall were not different with respect to the relationship between the student rankings and their consequent scores on the tests. Thus it can be suggested that retention was the same for content related to the least acceptable and to the most acceptable objectives.

Student rankings of objectives that were done at the beginning and the rankings that were done at the termination of the semester were different in all cases. It can thus be suggested that student acceptance of the objectives changed during the course as they were exposed to the content of the objectives. The change in the rankings of the objectives may suggest a greater understanding of the objectives at the termination of the course. In spite of the change in rankings, the final ranking bore no relationship to the final examination scores or the test of recall scores.